



FRIDAY, FEBRUARY 10.

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NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings Next Week.—Chicago, Caldwell & Southern, Philadelphia & Erie.

Elections.—Chicago & Eastern Illinois, R. Patterson, General Superintendent.—Chicago, Lodi & Southeastern, Thomas N. Rice, President.—Louisiana, Arkansas & Missouri, E. W. Soper, President.—Ohio, Indiana & Western, C. E. Henderson, General Manager.—St. Louis, Iron Mountain & Southern, R. E. Ricker, General Superintendent.—Waco & Brazos Valley, William Cameron, President.—Western & Atlantic, Joseph E. Brown, President.

New Companies Organized.—Chicago, Lodi & Southeastern files articles of incorporation in Indiana.—Chicago, Rock Island & Colorado files charter in Colorado.—Chicago & South Atlantic is incorporated in Tennessee.—Delphos & Northwestern files articles of incorporation in Ohio.—Elton, Denton & Lake Charles is incorporated in Maryland.—Jacksonville & Gulf is incorporated in Florida.—Johnson City Belt files articles of incorporation in Tennessee.—Kansas City, Watkins & Gulf files charter in Kansas.—Lincoln, Colorado & Western is incorporated in Kansas.—Long Beach is incorporated in Massachusetts.—New York and Ohio files charter in Ohio.—Palmdale is incorporated in California.—Waco & Brazos Valley files charter in Texas.

Changes and Extensions.—Dakota : St. Paul, Minneapolis & Manitoba graded to Huron.—Georgia : Chattanooga, Rome & Columbus completes survey to Carrollton.—Kansas : Kansas Midland is completed to Ellsworth.—Missouri : Chicago, Hannibal & Springfield completes survey to Ralls County.—Nebraska : Grand Island & Wyoming Central is completed to Grand Lake.—New Hampshire : Upper Coos will be extended to Basin, P. Q.—Quebec : Montreal & Sorel is opened.—Texas : Atchison, Topeka & Santa Fe opens Texas branch to Palmdale. Denison, Bonham & New Orleans will be extended to Bouham. St. Louis, Arkansas & Texas is completed to Hillsboro and Plano.

Traffic.—Anthracite coal shipments for the week ending Feb. 4 show a decrease of 12.5 per cent., as compared with the same period last year; bituminous shipments show an increase of 17.9 per cent. Cotton receipts, interior markets, for the week ending Feb. 3 show a decrease of 21.6 per cent., as compared with the corresponding week last year; shipments show a decrease of 12.7 per cent.; seaport receipts show a decrease of 24.5 per cent.; exports a decrease of 21.9 per cent.; cotton in sight is greater than at the same date last year by 5.0 per cent.

Earnings.—For the month of December fourteen roads report gross and net earnings, nine showing a decrease in gross and five a decrease in net; the total net increase is \$216,681, or 14.0 per cent. For the year ending Dec. 31, eleven roads report gross and net earnings, one showing a decrease in gross and four a decrease in net.

Miscellaneous.—Bay View, Little Traverse & Mackinaw is sold to the Grand Rapids & Indiana.—Chicago, St. Paul & Kansas and Kansas, Nebraska & Decatur consolidate under name of Chicago, St. Paul, Nebraska & Kansas.—Florida Central & Western is sold.—Montgomery & Batouche is sold.—Montgomery & Florida placed in hands of Receiver.—St. Joseph & Santa Fe and St. Joseph & St. Louis consolidate as St. Joseph, St. Louis & Santa Fe.

Contributions.

Straight or Automatic Air on Heavy Grades.

CHICAGO, Ill., Jan. 28, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in the very interesting accounts which you have given of the manner of operating the steeper grades and switchbacks, that the managers use the automatic brake for passenger trains in descending, and the straight-air for freight trains. There have been repeated illustrations of the danger of using straight air brakes. The "automatic" was

invented and substituted in order to prevent those very dangers, and it seems a most extraordinary thing that a road equipped with the "automatic" should, under any circumstances (except the incapacity of the trainmen), resort to the use of the straight air. The pressure retaining valves can certainly be put into place in the train as soon as the train could be converted from automatic to straight air; and the bursting of a hose, or some similar mishap, could not endanger the train, for the brakes would be surely applied.

You will remember, in the account given of the trip of the Westinghouse trains over the Baltimore & Ohio (each train being of 27 cars), they descended the long grades of 117 ft. in a mile without the slightest difficulty; the train being under most perfect control by the brakes, throughout the whole distance. In the name of good operating, I wish to protest against the conversion of the automatic brake into a non-automatic, upon any occasion.

ARCHIMEDES STEPHENSON WATT.

Safety Stringers in Wooden Trestles.

NEW YORK, FEB. 4, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 27 Prof. Swain very prettily demonstrates that in wooden trestles where there are safety or "jack" stringers, which are 2 or 3 ft. distant from the main stringers, only $\frac{1}{10}$ or $\frac{1}{20}$ of the weight is respectively carried by the jack stringers. With usual construction, however, the main stringers are made of double length sticks, breaking joints so that the stringer becomes continuous beam, while the jack stringers for economy (the longer pieces costing more) are made of single length pieces. Now the deflection of a continuous beam of constant cross-section loaded by a weight in the middle is

$$\text{deflec} = \frac{P l^3}{192 EI}$$

Substituting this in Prof. Swain's formula, in place of $P_2 l^3 / 48 EI$, and solving as he does, we find approximately that

$$\text{for } a = 3', P_2 = 74 P_1 \\ \text{for } a = 2', P_2 = 34 P_1$$

That is the jack stringers carry $\frac{1}{75}$ or $\frac{1}{50}$ of the weight, respectively, so that the main stringers practically receive no assistance at all from the jack stringers.

In addition to this it must be remembered that long ties, especially oak, tend to curl up at the ends, and so still further to relieve the outside stringers of any load. The evident moral to be derived is, when using jack stringers, the main stringers should be designed to carry the whole load (a practice too frequently disregarded); and secondly, when it becomes necessary to transmit the load through the tie, as when wooden floor beams rest directly on the top chord of a deck bridge, that they should be proportioned for sufficient stiffness as well as strength, the former condition usually requiring a greater section than the latter.

WM. BARCLAY PARSONS.

The Length of Dead-blocks and the Standard Coupler.

TO THE EDITOR OF THE RAILROAD GAZETTE:

After reading the report of the committee regarding the increased length of dead-woods, which has certainly developed from the Janney coupler alone, it came to my mind why did not the committee on brake tests settle their decision on the brake giving the poorest result with the most possible amount of cost, together with the largest percentage of danger connected with the apparatus thus selected. But this was not the case; the result now is that Mr. Westinghouse brought his brake up to the required standard, which he probably would have never done had the committee based their standard of efficiency from the first Burlington test, not saying what may be accomplished in the buffer brake system in the future. Then why should a selection of 9 in. dead-woods be made to suit one certain coupler, when all the improved forms of couplers will work with the standard dead-woods already in use. This increased length will be met at the June meeting, the cost of the increased length will be brought up, the extra length of trains will have its opponents; the increase of danger will have its say; the loss of the dead-wood now in use will look up as large as the Washington monument, and well it should. The committee should be complimented on their report as far as the length and standard are concerned; but let them say as the brake test committee did; we want all couplers to perform the necessary duty with our standard dead-woods. All couplers that will not now conform to them will soon find a way to. No doubt but the committee are anxious to get the matter settled, but the question needs considerable forethought, and should not be hastened along with a wrong step, which might prove fatal to the cause. If the committee will reconsider the matter of dead-woods and suggest the standard dead-woods, there can be no objections raised in the next June meeting of the Master Car-Builders' Association as to the length of stem and size of bar in the stirrup. There should be caution used in the increase of danger that will occur in lengthening out the distance between cars. The tendency should be to shorten if possible instead of increasing. Such couplers as require more space than the standard dead-woods can remain in use with the lug for protection until they are improved and brought to the standard of dead woods now in use. If the vertical plane coupler is handled correctly in its introduction, it will come to stay, and its enemies will be its best friends in the near future, but if caution is not used in the commencement, the result will be condemnation and a total failure.

A CAR COUPLER MAN.

[Our correspondent is invited to answer briefly two

simple questions. 1. Can any vertical plane coupler in use be efficiently protected by the present 6 in deadblock? 2. Does not our correspondent's coupler require a 10 $\frac{1}{2}$ in. deadblock, or 4 $\frac{1}{2}$ in. longer than the present 6 in. deadblock, and 1 $\frac{1}{2}$ in. longer than that required by the Janney coupler?—ED. R. R. GAZETTE.]

Experience with the Sewall Heating.

PORTLAND, Me., Feb. 4, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

During the late storm in New England and Canada the company's appliances have been subjected to many severe and interesting tests. One of these was on a train on the Maine Central, which was stalled at Greene for 23 hours, from the afternoon of the 29th to the afternoon of the 27th ult., the thermometer averaging about 10 degrees below, with high wind and snow. About a hundred passengers, many of them ladies and children, remained for this time in the cars in perfect comfort, and the officials of this road, who have now nearly completed their equipment, having been the first to adopt the Sewall heating system, are much gratified with this success.

Another test of still greater severity was bad in the same storm on the Intercolonial Railway on the first train run on that road under continuous heating. The train consisted of one baggage car, one combination car (postal and smoking), one second and one first class coach, and left Moncton, Jan. 25, at 5.30 a. m.; thermometer outside 13 degrees below, whence it ran up to noon to 20 degrees above, and then gradually fell, standing at 5 p. m. at 12 degrees below. The run of 490 miles in this temperature was made with the usual success, temperature in cars being kept at 70 to 72 degrees. On the return trip this train, having two engines, was stalled at St. Fabien, near Rimouski, in what western men termed a blizzard. Thermometer 10 degrees below, wind terrific and so full of snow that a person could not be seen 20 feet away.

The engine was cut from the train six times, and at one time was absent over two hours. During this long separation the glass only fell 14 degrees inside the cars, showing ability to retain heat. Reaching Moncton a novel and useful test was had. Being the first train out, the cars were needed to go on to Halifax, but no engine equipped with steam heating apparatus could be had. One without it was attached, fires built in cars, and the run of 188 miles was made to Halifax. The outer pipes, drips and couplings were subjected to the severe cold, the motion of the cars causing any little condensation in the pipes to trickle slowly *en route*. At Halifax they stayed over night in sheds, and returned the next morning to Moncton, another 188 miles, under stove heat. Reaching Moncton, the engine with steam heating equipment was in waiting, and was attached. The steam passed through the system readily, and the drips working nicely. The stove fires were extinguished, and the train went on its way to Quebec. It is difficult to see how a more thorough and exhaustive test than this could have been made.

JOS. T. WOODWARD,
Ast. Manager Sewall Safety Car Heating Co.

Telegraphic Train Orders.

PITTSBURGH, Pa., Jan. 23, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

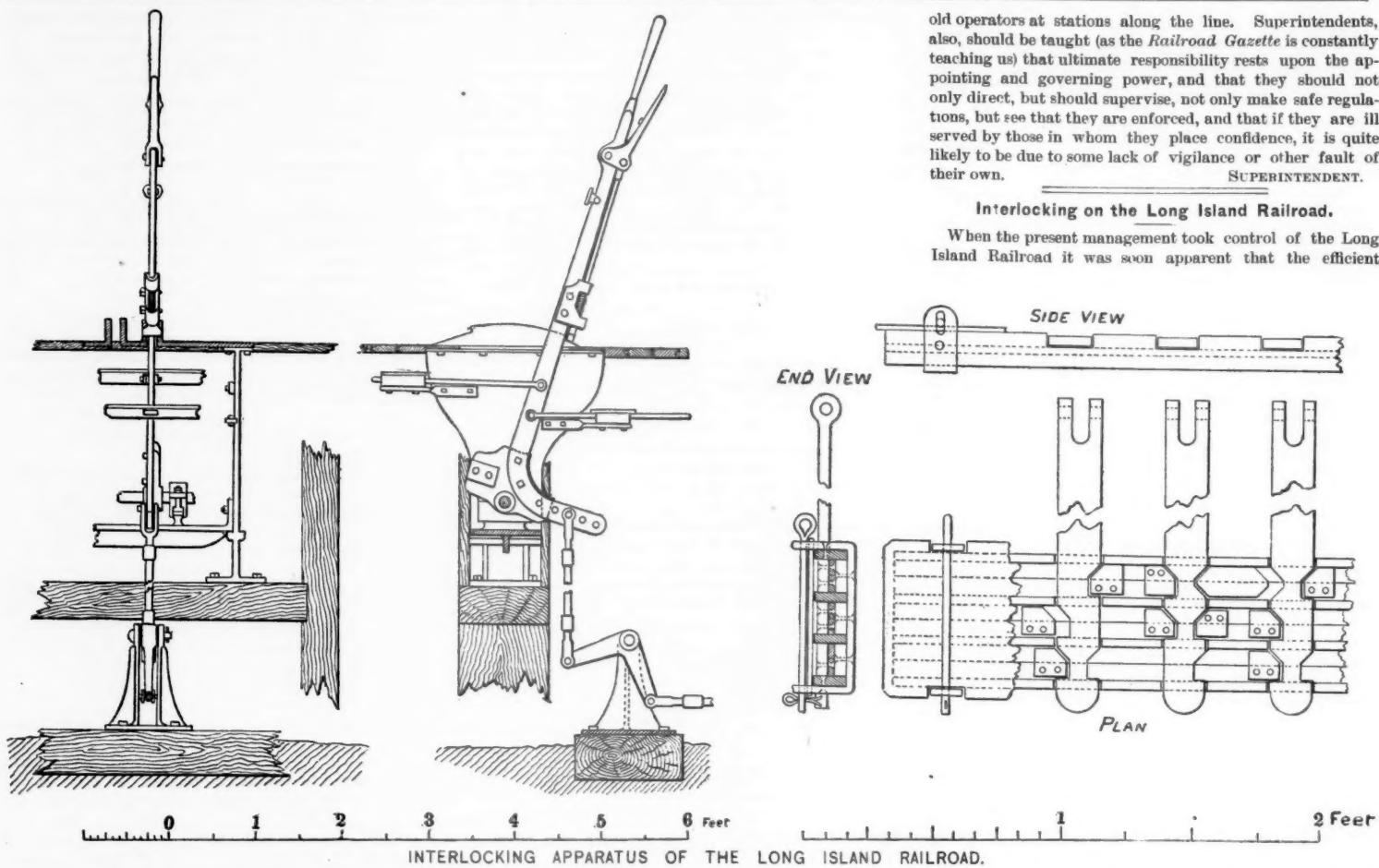
Noting the communication signed "Orders" in your issue of Jan. 20 relative to the late accident at Finleyville, on the Baltimore & Ohio, and to the general question of allowing an inferior train to run against a superior train without first obtaining the signatures of the conductor and engineer of the latter to an order curtailing their schedule rights, I venture to take exception to your following remarks upon the advance order plan:

"But it could not always be adopted, and its use might offer a temptation to lapse into the old way of thus holding a train while issuing orders for the movement of inferior trains short of the point given, *without duplicating them to the superior train.*" (The italics are mine.)

Now, our friend "Orders" distinctly says that the road which he refers to as using the advance order system "uses the duplicate order exactly as provided for by rule 510;" and further on he says: "Of course the operator at the last mentioned point (*i. e.*, the point at which the superior train is being held for orders) holds the duplicate of every order given to inferior trains, and keeps his signal set for orders."

Under such a plan as this, such an accident as that at Finleyville could not have occurred, because ere the dispatcher could have run an extra against 2d 87, he would have been required to hold the signatures of conductor and engineer of 2d 87 to one of two positive orders; either an order fixing the meeting point or an order to not pass Finleyville without orders. The first order, would of course, have been given if the dispatcher could fix the proper meeting point and get both trains simultaneously, or very nearly so; if he could not, the second would have been used and would have held 2d 87 at Finleyville for further orders. You say: "Under the evident conditions of carelessness the true 2d 87 might readily have been allowed to pass as the 1st, with the information that there were no orders for it." Not so easily, at least with any ordinary understanding of the true force and meaning of a regular train order reading, "to not pass Finleyville without orders," because, with such an order in their possession, no conductor or engineer whom I ever knew would pass the holding point on the mere display of a white signal, or on the verbal assurance of an operator that there were no orders, but would require another train order (even if it said nothing else but "no orders") duly "completed."

This case grows into more importance the more you think



about it, because it forcibly illustrates about the only weak spot in the new train rules. (The Baltimore & Ohio's rules are not identical with those of the uniform code, but on this point they embody the same essential principles.) Excellent as these rules are, they would be infinitely more excellent if that important rule 510 contained a few words less; if the first sentence were omitted, and if there were also erased the qualifying words, "whenever practicable," which now serve to weaken a rule otherwise admirable in its simplicity and strength. It should read: "The signature of the conductor and engineman of the train of superior right must be taken to the order before the train of inferior right is allowed to act on it." Or, for the sake of clearer expression: "The signatures of the conductor and engineman of a train of superior right must be taken to an order restricting their schedule rights before 'complete' is given to an order to a train of inferior right that will permit the latter to use the time and rights of a superior train."

What a guarantee of safety would be afforded by a rule of this kind! But the addition of the words "whenever practicable," at once casts doubt upon the practicability of the rule, and extends an invitation to train dispatchers to throw responsibility upon operators, by "completing" their orders to an inferior train before the conductor and engineman of a superior train are heard from; and this once done, what is to prevent a disastrous collision, with possibly heavy loss of life, but the unerring and sleepless vigilance of perchance a lad of 16, or of a young girl, or, it may be, of a sufficiently mature person, but one who may have ticket selling, freight business, baggage checking, mail delivery, and Western Union work to attend to, in addition to the delivery of this life-and-death order to a superior train? Is it any wonder that, often, such orders are not delivered? In such cases it is easy to throw all the blame on the operator. The researches of a coroner's jury usually do not go far below the surface of the testimony; but the moral responsibility rests on older and broader shoulders than those on which it is often placed, and in these days of state and national railroad commissions, it is but a question of time before keen and searching scrutiny will in some of these cases put the blame where it belongs.

It is from this standpoint that the suggestion of your correspondent, "Orders," is to be regarded with the greatest interest. Is it possible to abolish the phrase "whenever practicable," and to hold a train dispatcher to a rigid cast-iron rule of assuring himself of the delivery of the order to the ruling train before allowing the inferior train to use a corresponding order against it? Possibly a majority of train dispatchers and superintendents will at once say "No, it can't be done. If we try to do it, the greatest delays will be caused. Even if telegraph offices are increased until the capacity of the wire is overtaxed, still grievous delays will result, for superior trains will still be held between telegraph offices by utterly unlooked-for causes, and under the operation of such a rule, we could not help the inferior train to the slightest extent until the superior train finally turned up at a telegraph office." And so, upon this reasoning, this good rule 510 is emasculated, by the use of the qualifying term, "whenever practicable;" and upon warrant thus given, train dispatchers proceed as before to move inferior trains upon the mere O. K'ing (or receiving) of orders to superior trains by the operators who have re-

ceived them and have not yet delivered them. What is O. K'ing under such circumstances but a legalized "flag and hold?"—and yet "flag and hold" orders when so expressed without circumlocution are a generally admitted abomination. Truly, it would take a Philadelphia lawyer to define the exact shade of difference between the one form of chance-taking and the other.

In its issue of Dec. 30, 1887, after commenting upon this same Flinleyville accident, the *Railroad Gazette* remarked, editorially, as follows: "Where the rule requiring the consent of the ruling train to be always first obtained is laid aside or suspended simply from lack of offices, operators, or dispatchers, it will be well to consider whether the lives of passengers and train men and the reputation of the road do not demand an increase of facilities in this direction."

Wise words those; and now promptly comes forward your correspondent "Orders," to testify that it has been found practicable to move trains in both directions by telegraph without the risk incurred by giving the running right to the inferior train previous to obtaining the understanding of the conductor and engineer of the superior train that their rights have been curtailed, and without delay to either train, and without multiplication of telegraph offices. And he explains how this is done: * * *. Three men are responsible and "interested in the delivery of the orders." Could precautions in the way of making a safe meeting point go further, or could chances for delay be reduced to a smaller minimum, or is it surprising that on the road referred to—a single track road, with business for fifty crews—there has not been a collision from misdelivery of orders during the entire period of over thirteen years that this system has been in use?

"Orders" does not claim, nor do I, that this advance order system is new and original. It may be, for aught we know, common enough on plenty of roads, and if so, we venture to assert that those using it are well pleased with it; but it does not seem to be in common use hereabouts, possibly because some may think, as does the *Gazette* of Jan. 20, that it might offer a temptation to lapse into the old single order system. If so, they may be assured that the duplicate order system, once tried, is not likely to be departed from; but that if they will try "advance orders" to superior trains, in connection with the duplicate system, they will find the grafting process a very easy one; that train dispatchers will soon fall into the habit of using excellent forethought in order to gain the best results from their "advance orders;" and that it will be found possible for safety and celerity in train movement to go hand in hand. Then, with chances for delay largely eliminated, may we not adopt rule 510 in the strength and simplicity which it would present with the evasive, shuffling "whenever practicable" erased from it. * * *. The rule should appear without any hazardous qualifications, and if unusual circumstances at any time necessitate departure from it on the part of a train dispatcher, let him explain all the facts to his superintendent as soon afterward as possible, if he cannot do so at the time.

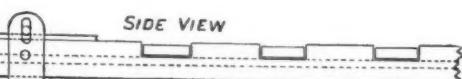
Dispatchers should be taught that the primary responsibility for safe train running is upon them, they being experienced men, carefully selected for their positions on the score of fitness and relieved from all other duties that may conflict with their important business of running trains, and that they must not delegate this responsibility to young or

old operators at stations along the line. Superintendents, also, should be taught (as the *Railroad Gazette* is constantly teaching us) that ultimate responsibility rests upon the appointing and governing power, and that they should not only direct, but should supervise, not only make safe regulations, but see that they are enforced, and that if they are ill served by those in whom they place confidence, it is quite likely to be due to some lack of vigilance or other fault of their own.

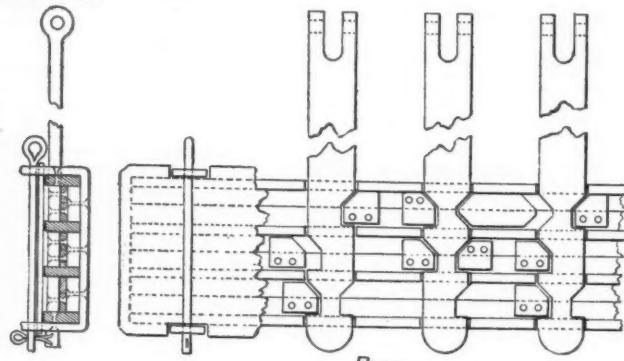
SUPERINTENDENT.

Interlocking on the Long Island Railroad.

When the present management took control of the Long Island Railroad it was soon apparent that the efficient



END VIEW



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operating of it demanded the best possible system of train protection. There are numerous junctions and crossings, and the business of the road consists to an unusual degree in the movement of passenger trains, running short distances, and at considerable speed between stations. Some notion of the relative importance of this part of its business may be got by comparing it with the Pennsylvania lines east of Pittsburgh and Erie, and with the Erie. The Pennsylvania does a very large suburban business out of several cities, and the Erie a large but less important one. We will compare the passenger train miles, freight train miles, passenger miles and ton miles per mile of road operated on each of the three roads, and take the Long Island traffic as unity. The comparison will not give the absolute traffic per mile operated, but will show the relative density of each kind of traffic on each of the three lines. The figures are for 1886, and are taken in round numbers.

	Long Island.	Penna.	Erie.
Pass. train miles.....	1	0.83	0.67
Freight ".....	1	11.2	7.88
Passenger miles.....	1	0.78	0.55
Ton miles.....	1	31.00	31.00

It will be apparent from these figures how important a part of the business of the road the short distance passenger trains are, and within a radius of 20 miles there are some 20 junctions and crossings. Although the first expenditures of the present management were necessarily in the improvement of roadbed, track and rolling stock, they early began that system of interlocking which has since been carried out with great thoroughness. The Union Switch & Signal Co. first put up three towers—at East New York junction 24 levers, at Fresh Pond 16 levers and at Winfield 24 levers. The East New York tower is an iron structure spanning the Manhattan Beach tracks at a crowded point, where rapid transit trains are run independently of the regular traffic.

The company then began building its own interlocking apparatus. The mechanism adopted is shown in the illustrations herewith. It is a modification of the old Stevens apparatus, and was devised by Mr. T. W. Burley, foreman of the interlocking work at Long Island City. The interlocking systems have been designed and carried out under the immediate orders of the General Roadmaster, Mr. G. W. Offutt. The interlocking is actuated by the motion of the levers. The arms extending forward and backward from the levers give motion, by means of the beveled lugs shown in the plan, to bars which move longitudinally of the frame. These arms are in turn interlocked by the motion of the sliding bars. The mechanism is so simple that its action can be readily understood from the engravings. It will be seen that the principle of actuating the interlocking by the movement of the spring latch is abandoned, and this must be regarded as a departure from the best practice. On the other hand, the machine is simple and comparatively inexpensive, and it may be found in practice that the objections to other devices working on this principle, which have arisen, will not obtain in this case.

There are now in service 14 towers aggregating 302 levers, as follows: Montauk junction, 48 levers; Fresh Pond junction, 18 levers; Winfield, 24; Glendale junction, 12; East New York junction, 24; Manhattan Beach junction, 8; Jamaica cross switches, 48; Rockaway junction, 12; Valley Stream junction, 24; Pearsall's junction, 14; East Hinsdale,

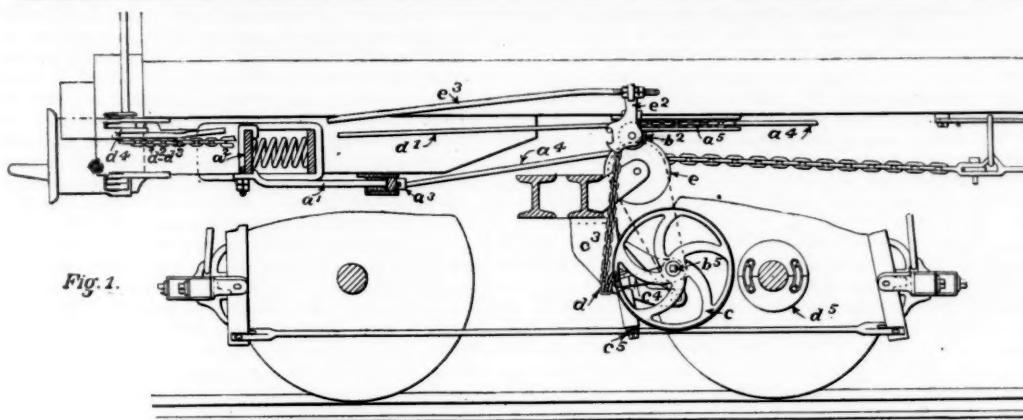


Fig. 1.

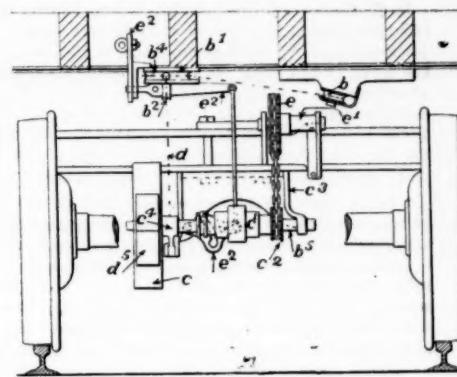


Fig. 3.

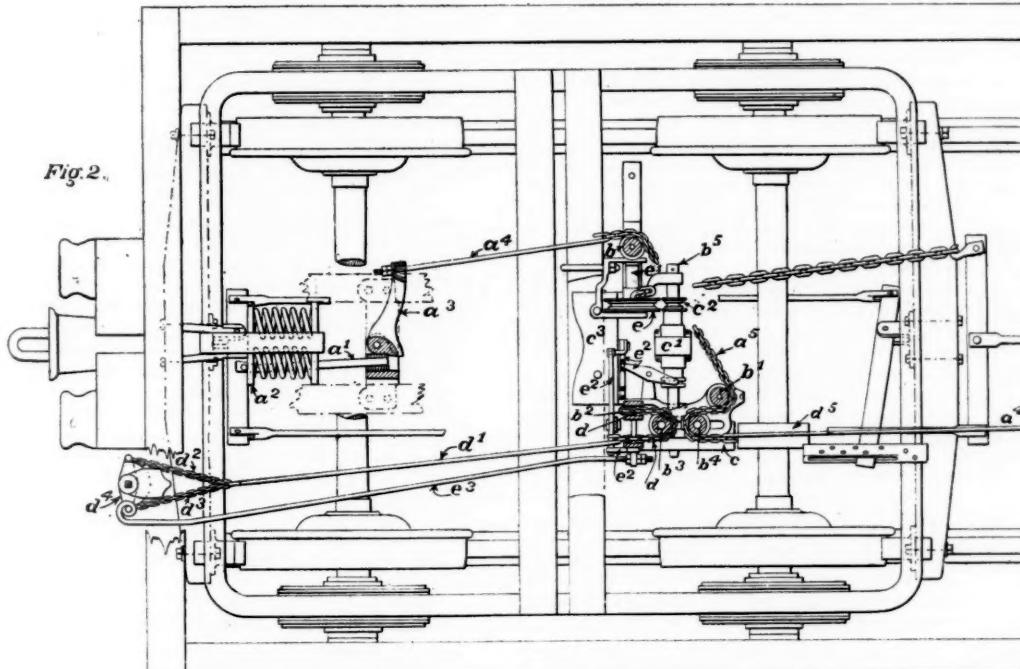


Fig. 2.

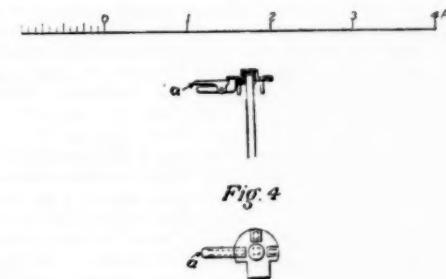


Fig. 4

THE TURNER-BEARD BUFFER FREIGHT BRAKE.

24; Bethpage junction, 20; North Shore, 16; and Wood Haven, 12 levers.

The most important points protected by the interlocking are Montauk junction, just outside the main yard, at the Long Island City terminus, and the Jamaica cross switches. Each is worked by 48 levers. The Montauk junction tower stands in a position from which switches can be handled and signals set protecting all trains east-bound from the yard, and all west-bound trains from the North Shore division, the old Long Island road, all main line and Montauk division trains, as well as Long Beach, Rockaway and Manhattan Beach tracks; 239 regular trains are handled by the two operators in this tower daily, besides the immense amount of drilling necessarily performed at this point. Though not required to handle so many trains, the apparatus at Jamaica cross switches is fully as important and as complete in all its appointments.

At East Hinsdale a set of arm gates for a highway crossing is worked from the tower and interlocked. At this point, as well as at all the towers lately constructed, derailing switches are used, and the statement is made that "they work very effectually in preventing engines passing the home signals," which no one can doubt.

A few other points on the line of road remain as yet unprotected, but will receive attention as fast as the work can be pushed. The most important of these are Garden City, Belmont Junction, Hicksville, Mineola and Van Wicklens.

The Turner-Beard Buffer Freight Brake.

The accompanying illustrations represent a form of buffer brake that is now being applied to 100 freight cars on the Boston & Albany.

It will be seen that the brake is primarily actuated by any compression of the draw-springs caused by a check in front of the train or by the application of the brake on the engine. The inward movement of the drawhead causes a friction wheel connected with the chain of the ordinary foundation brake rigging to engage with a friction wheel fast on an axle. The brake chain is then wound up by the rotation of the friction wheels which continue to revolve until the car wheels skid or the pressure on the drawhead is released. It is claimed that a spring limits the maximum force with which the brake is applied. The brake must be set for the direction in which the train is moving, and is inoperative in backing unless a lever is moved by hand for that purpose.

Mr. W. B. Turner, the president of the Turner-Beard Brake Co., writes us as follows:

"The brake is known as a friction brake and the action is as follows: The drawheads of the car are connected by means of levers and a rod and chain connection through which the first $\frac{1}{2}$ -in. of inward motion is transmitted to a lever that brings the friction wheel into contact with a friction collar

that is secured to the car axle. The power to apply the brake is derived from the revolution of the axle by the pressure of one wheel against the other. An adjustable spring is interposed in the connection by which the power of the brake is determined, said spring is adjusted so that the brake will not slide the wheels. A lever is located on the top of the car, by which the brake is made to operate in the direction in which the train is going or rendered entirely inoperative, as desired. When this lever is set for the train to run east, the brake will not operate if the train be run west. Hence the train may be backed with impunity."

The combined action of both drawheads is necessary to apply the brake, and releasing the pressure on either drawhead releases the brake.

We have made stops at 28 miles an hour in 376 ft., and have graduated trains of 40 cars down 80-ft. grades by using the hand brake on the two front cars (this was where there was no brake on the engine), and have also let trains down grades with the tender brake.

The points of superiority which we claim for the brake are:

1. Its independent character, by which mixed trains may be handled without extra switching.
2. The brake will stop a train in the least possible distance consistent with safety.
3. It will not cause sliding of wheels.
4. It is very simple in construction.
5. Its cost is but nominal when compared with others.

Its extreme cheapness and its independent character are the strongest points in its favor for freight service. These, combined with the fact that it is under the control of either the engineer, conductor or brakeman, and that it will handle a train either on the level or on grades equal to, if not superior to, a continuous brake, and that we can graduate the brake pressure in proportion to the weight of the car and its load, and in fact perform every function necessary to the proper and economical handling of freight trains, render it the most adaptable brake for freight service.

It causes no shock in stopping trains. The power of the brake can be graduated in proportion to the weight of the car when empty, and can also be automatically graduated in proportion to the weight of the load.

We can stop the rear portion of a train, that becomes accidentally detached, and, in fact, it will perform any and every duty required of a brake in the freight train service.

We have experimented with it on the Boston & Albany for over two years, in which time all our improvements have been made. The brakes were turned out into actual service and carefully watched and as soon as any defect was found it was corrected. This line of operation we followed until there was no further improvement to be made.

We not only submitted the brake to the tests of actual service, but we made various tests to determine its practicability in stopping trains without causing shocks and to see in what distance it could be done, and in fact any and all tests that the freight service would require.

The results of our tests were so satisfactory that the Boston & Albany have equipped nearly 100 cars at their own expense and from present prospects the day is not far distant when they will begin the equipping of their entire freight equipment."

The following detailed description of the brake will be best understood by referring to the engravings.

The following sign is printed on every car: "In use point

this handle towards the engine, in the centre notch the brake is inoperative." The handle a , fig. 4 being pointed toward the engine, the brake will be operative when running in this direction, under the control of the engineer. If he wishes to stop or slow up, he shuts off steam and applies a brake to his engine; this causes a closing up of the train, which produces a push inward on the draw-bars of each car. When the draw-bar is pushed in $\frac{1}{2}$ in., the rod a^1 attached to the follower and acting on the lever a^2 , draws the rod a^4 back 3 in. This operation is alike on both ends of the car and the rods a^4 are connected with each other by the chain a^5 . The guide pulleys b , b^1 and b^2 are fixed, but the pulleys b^3 , b^4 are movable lengthwise and connected with each other. The shaft b^5 , fig. 1, carrying the friction wheel c , the reversible clutch c^1 to which is attached the sprocket wheel c^2 , has one bearing in the bracket c^3 and the other in the lever c^4 . One end of said lever c^4 rests in the bracket c^3 , the other end is supplied with the spring c^5 to which is attached the chain d . Said chain d passes round the pulley b^3 and is by the rod d^1 connected with the chains d^2 , d^3 , fastened to each end of the lever d^4 , this being operated by the handle a . When the draw-bars are in the ordinary position and the lever d^4 in its centre one, as shown on fig. 2, there is 6 in. slack in the chain d . But when the lever d^4 is turned 90 degrees to either side, there is 3 in. slack in the chain d . When now the lever d^4 is in its centre position and the rods a^4 have gone back 3 in., the pulleys b^3 , b^4 will be moved 3 in. in opposite direction of lever d^4 , thus taking up 6 in. slack of the chain d , but leaving the position of the lever c^4 unaltered, consequently the brake is inoperative. But when the lever d^4 is turned 90 degrees to either side corresponding with the direction in which the car is going, and the rods a^4 have gone back 3 in. each, the pulleys b^3 , b^4 will be moved 3 in. in opposite direction of the lever d^4 , thereby taking up the 3 in. slack in the chain d and lifting the lever c^4 until the friction wheel c is brought into contact with the friction collar d^3 and compressing the spring c^5 until the rest of the 6 in. is taken up. The friction wheel c will now revolve, taking with it the shaft clutch and sprocket wheel. This transmits the power to a larger sprocket wheel e , which winds the brake chain on the drum e^1 , thus bringing into action the ordinary brake mechanism of the car and gradually, yet forcibly, to any extent applying the brake. By a set of common levers, all marked e^2 , connected with the rod e^3 , attached to the lever d^4 , the clutch can be reversed in order to correspond with the direction in which the train is going. But when the handle a is pointed in one direction, the brake will not work in the opposite direction, when, for instance, the friction wheel c by backing is brought into contact with the collar d^3 , thus allowing the whole train to be freely backed.

Resistances of Vestibuled Trains.

In the *Railroad Gazette* of Jan. 27 was published a letter from Mr. Samuel McElroy, in which he mentioned some experiments made by Sir Henry Bessemer in 1847 to determine the saving which might be effected in the resistance of the atmosphere to moving trains by the use of what is now called a vestibule. As some correspondents have expressed a wish to know more of those experiments we reprint from the *Practical Mechanic and Engineers' Magazine* of June, 1847, an abstract from Bessemer's paper on the subject:

"In my experiments before referred to, I fitted up an apparatus consisting of a horizontal wheel supported by a vertical shaft, which was driven by bevel gear, and connected to a steam engine. The horizontal wheel was keyed firmly to the shaft, and carried upon it a second wheel made of wrought iron, and free to move upon the shaft. This second wheel was placed above the first, and supported upon it by small anti-friction wheels of steel attached to the upper one, so that the upper horizontal wheel could revolve with exceedingly little force. One of Salter's spring balances was attached by its opposite end to one of the arms of each wheel, so that the two wheels were made to move in concert, excepting when any opposing force was applied to the progress of the upper wheel, when the spring balance served to indicate the amount of such opposing force. But as the indications could not be read off during the experiment, I attached to the index a pencil tracer and card, so that when the apparatus was at rest, the resistance which had been indicated on the card could be read off. Matters having been thus arranged, a model carriage of wood on a scale of one-sixth the size of those in use upon railways was attached to the light iron wheel, and the apparatus put in motion. The amount of resistance opposed to the passage of the carriage through the air was ascertained by the wheel on which it was placed, moving on its friction rollers and indicating on the spring balance the pressure. The speed was gradually augmented from the time of starting in each experiment; and when the number of revolutions per minute was attained, which was equal to the number of miles per hour previously determined on for each series of experiments, the speed was gradually diminished till the carriage was brought to a state of rest, when the indication on the card was copied off, and the same experiment twice repeated, so as to obtain in all cases the mean of three experiments. The first series indicated a resistance of 2.1 lbs. per square foot of front surface of carriage at 20 miles per hour; a resistance of 3.2 lbs. at 25 miles per hour; a resistance of 4.5 lbs. at 30 miles; a resistance of 6.1 at 35 miles; a resistance of 10.0 at 45 miles per hour.

"The last was the highest rate of speed which the apparatus was capable of moving at without danger of derangement; and the resistance at this rate per superficial foot of frontage of carriage amounted exactly to 10 lbs. I took this speed as the basis of my subsequent experiments, because the various pressures, being expressed in round numbers, will impress themselves more distinctly on the mind than if decimals were used. Having thus ascertained that the pressure amounted to exactly 10 lbs. on the end of the model carriage of 1 foot square, a second carriage was placed between the buffers left open, as is the present practice on railways. The two carriages being put in motion at the selected rate of 45 miles per hour, the resistance indicated as the mean of three experiments was 14.1 lbs., so that, striking off the decimal, we have 4 lbs. resistance per superficial foot of the second carriage. A third carriage was connected before, and the experiment proceeded with in a similar manner. The indication was now 18 lbs., showing an addition of 4 lbs. for the third carriage. Three more carriages were successively added, and the result in each case was precisely 4 lbs. per superficial foot. A train of six carriages being thus connected, the spring balance indicated 30.5 lbs.; but, as before stated, I throw off the decimal, and thus obtain 10 lbs. resistance for the first carriage, and 4 lbs. for each of the five following carriages, making 20 lbs. resistance for the intermediate carriages, or four-tenths as much pressure on each of the last carriages as was exerted on the first. Having arrived at this important result, the next stage of experiments, and that on which depended entirely the success of the plan I had devised in my mind for reducing the atmospheric resistance on the ends of the intermediate carriages, was now to be tried. For this purpose I had five small hoods of wood made to fit into and fill up the intervals between the ends of each carriage. One of these hoods was placed in between the first and second carriages of the train of six, which thereby presented externally the appearance of a double carriage, without any vacancy or space between them for the atmosphere to impinge against. The train was now brought up to 45 miles per hour, and the mean of three experiments showed a diminution of 4 lbs. in the general resistance. A second space was then filled in, which resulted in another reduction of 4 lbs.; the remainder of the spaces were then successively filled up, with a like result in each case. The train presented at last the appearance of one immensely long carriage, without any break or interval to catch the air, and thus arranged, the whole train suffered only a resistance of 10 lbs., being precisely the same as that of a single carriage, and clearly demonstrating that in the case of a train of six carriages two-thirds of the atmospheric resistance could be saved by merely filling up the intermediate spaces.

"The next point to be ascertained was how much further the remaining 10 lbs. could be reduced. With this view two more carriages were constructed; the ends were of a wedge form, like the bow of a ship: that is, the floor and roof of the carriage were pointed like the bow, while the sides of the carriage were left perpendicular, thus forming a sort of

equilateral triangle, with its base attached to the parallel sides of the carriage. It was my intention to place of these carriages at the fore and the other at the after part of the train. One of them was accordingly placed in front, and the train brought to a velocity of 45 miles per hour. The pressure indicated was now reduced from 10 lbs. to 6.3 lbs., although seven carriages were used. This was the first of three experiments intended to be made to get a mean pressure, but, unfortunately, in the second experiment with these seven carriages, the centrifugal force was so enormous, that one of them became detached, and abutting against a side wall, formed a solid obstruction to all the rest, and the result was the destruction of the whole train of carriages. I was thus prevented from making the further trial with the wedge-shaped carriage placed at the stern. I had intended to put my apparatus again in order, for the purpose of trying this last-named experiment, and also with a view of ascertaining the most advantageous form of wedge, but pressure of business prevented this being done at the time, and I have not since had leisure to resume the inquiry. However, I have clearly demonstrated this much—that the resistance of the atmosphere to railway trains is exerted on the ends of each of the carriages forming a train, and amounts in each case to $\frac{1}{3}$ of the power exerted on the first, and, also, that by filling the intermediate spaces between the carriages, this pressure on them will be most materially diminished."

Mr. Bessemer appended a series of tables, setting forth the diminution of the resistance, with his wedge-shaped carriages and filled up spaces, as compared with the widely separated and flat-fronted ones of the ordinary construction; the loss of power in the latter case being based upon the observations both of Dr. Lardner and Mr. Robert Stephenson. According to the formula of the latter gentleman, the resistance of three trains of 10, 15 and 20 carriages respectively, moving at 35 miles per hour, with a gross weight of 40, 60 and 80 tons, experiences a detrimental resistance, including all sources, of 1,200, 1,800 and 2,400 lbs.; while by the use of Mr. Bessemer's modified carriages, the same conditions are represented by 574, 781 and 986 lbs. of total resistance. In the express trains, where the speed is increased to 60 miles per hour, the total opposing forces amount to 2,800 lbs., while the author contends that his proposed practice would reduce this to 922 lbs., or less than one-third.

Bessemer's "vestibule" was to have been constructed as follows: Each end of the carriage would be fitted up with a hood or flexible covering of leather or gutta percha, similar to the ordinary collapsible covering of pleasure carriages. The frame of the hood would be attached by hinges to the projecting head of the buffer, and strengthened from within by suitable diagonal braces.

Railroad Commissioners of Connecticut—Annual Report.

The Railroad Commissioners of the state of Connecticut have submitted their annual report for the year ending Sept. 30, 1887. They note that Connecticut has again become a railroad-building state, having constructed 11.9 miles the last year.

The Commissioners speak as follows of the consolidation of the railroads of the state:

"There are now 23 railroads being operated and reporting to us, comprising, within the state, 973.38 miles. Fourteen of these, representing 489.65 miles, are leased to other roads and being operated by them. It is a matter of public interest to notice the effect of this policy of concentration of management upon the condition of the leased properties, and upon the character of service which they render the public. A careful comparison of the present condition and service of the leased roads with their former condition and service when each was operated under a separate and independent management, will develop the fact that the roadbed, track, bridges, buildings and equipment upon such lines have been greatly improved, and better facilities have been afforded for the transportation of passengers and freight at reduced rates. It is hoped that similar results will follow upon the lines leased during the present year. The gross earnings of the roads exceed, in the aggregate, those of the previous year, and the operating expenses have increased in a still greater proportion, thus showing a slight decrease in the net earnings."

ACCIDENTS.

No train accidents occurred causing serious injury to passengers. The casualties compared with the previous year were:

	1887.	1886.
Passengers killed	3	5
" injured	22	37
Employés killed	22	23
" injured	208	142

All injuries to employés, fatal and otherwise, are classified as follows:

	1887.	1886.
Miscellaneous	85	80
Failure from trains	37	27
Coupling cars	108	60
	230	167

It will be observed that the coupling accidents have increased 80 per cent. The Commissioners attribute the great increase in coupling accidents to the introduction of various modern automatic car couplers to such an extent as to necessitate more or less coupling between different types of automatic couplers, and between them and the old link and pin couplers; and they add, while this is no argument against the introduction of automatic couplers, it is a very strong argument for all possible haste in selecting a standard.

HIGHWAY CROSSINGS.

The number of persons injured at highway crossings was more than double that of the previous year, amounting to 35, of whom 22 were either killed or fatally injured. It is noted that 5 of those injured at highway crossings were struck at crossings provided with gates or flagmen and one

at a crossing at which there was a signal bell. The Commissioners discuss briefly the state law which provides for the elimination of grade crossings, and are of opinion that a year more of active experience with existing laws will better qualify all parties to judge what alterations, if any, may be needed. Forty-one petitions have been presented to the Commission asking for the separation of grades of highways and railroads, and over 60 hearings have been held on these petitions and orders made for the elimination of 32 crossings. Petitions are still pending as to 37 others. It has generally been claimed that the public safety required the changes proposed, but that the entire cost of the change should be assessed on the railroad company. In many cases, however, an agreement has been effected between the towns and the company. In the cases in which separation of grade has been ordered the estimated cost is \$183,150, of which \$26,525 has been apportioned on the towns. The Commissioners felt the necessity of assessing a larger proportion of the expense upon the company than they should have done if the expenditure had been extended over a term of years. The total number of highway crossings at grade in the state is now given at 1,215, and those over or under the tracks at 287.

SUNDAY TRAINS.

With regard to the Sunday railroad traffic the immediate effects of the law are summed up as follows:

"The cessation of unnecessary labor at the leading freight stations; no trains running, and therefore quiet along the railroads during the morning and afternoon hours commonly devoted to public worship; no excursion trains and none asked for; no freight trains from sunrise to sunset, except the very few needed for perishable freight, and these in the morning and evening hours; one through passenger train, besides those carrying the mail. The milk trains continue to run, generally in the early morning."

With regard to lighting trains, the Commissioners do not regard the danger from the use of oil lamps as such as to authorize an order that they shall be immediately given up, nor do they regard the use of electricity for lighting as being yet shown to be cheap enough or practicable enough to warrant its general introduction. The returns published by the Commissioners show that no company in the state has adopted steam heating for general use and that very little is being done in experimenting. In view of the present condition of the question the Commission has thought that neither public safety nor prudence requires them to order the immediate adoption of that mode of heating; but they have notified the companies that unless the present winter develops unexpected difficulties, they may expect an order to provide for heating their passenger cars after this season by some system of continuous heating.

Station Lighting in Europe.

In recent issues we have given summaries of the report made to the International Railroad Congress, at the Milan session, on station lighting with gas and electricity. Following are some notes of the practice in lighting by oil, taken from the same report.

Petroleum lamps with a double air current and a large hourly consumption of oil are very little employed by the railroads, notwithstanding the advantages which they offer, and notwithstanding their extensive adoption for private lighting. However, the administration of the Belgian state railroads have given the results of some experiments with recent types of these lamps. It is important to mention an improved lamp for the burning of heavy tar oils used by the Western Company. This lamp will do good service for the lighting of out-of-door spaces where gas cannot be had, and where there is not sufficient motive power to supply electric machinery.

Colza oil, which was formerly almost the only kind used, has been gradually replaced by petroleum. Colza oil is still, however, employed in some particular cases. The substitution of petroleum, although made long ago in certain countries, for instance, Belgium, has only been adopted in France much later. The Western adopted petroleum in 1874, but the French State Railroad did not adopt it until the past year. A great variety of burners are employed by the different railroads. It would be useful to know the hourly consumption, lighting power, etc., of the petroleum burners in use by the different railroads, but the data are very incomplete. They show a variation in the hourly consumption from 0.55 to 1.45 ounces, and the lighting power varies from 6½ to 10 candles. The good quality of the petroleum is of great importance. The following are the specifications issued by the Western Railroad of France:

"Pennsylvania petroleum without mixture of any kind must have a density of 705 to 805 at a temperature of 59° F and not be inflammable below 113° F. When agitated with a solution of bichromate of potash, acidified with 5 per cent. of sulphuric acid, it should regain its limpidity after standing five minutes. The precipitate at the bottom of the vessel should not be of green color, which would indicate the addition of shale or some other oil. A trial is to be made when the oil is delivered, and another at the end of four months. Tanks for the storage of the oil will be furnished by the receiving agent. The price of the oil is governed by the mean of the quotations during the month of delivery, of crude oil landed on the dock at Havre. This is increased by a certain constant sum for the expense of refining, etc."

The freight station at Achères, Western of France, lighted entirely by petroleum, has 160 burners, of which 55 are in the interior. The expense was in 1886: Petroleum, \$1,083; labor, cleaning the lamps, etc., \$755; repairs, renewals, wicks, etc., \$252; total, \$2,090—equal to \$13.08 per lamp per year. Or supposing only 2,000 hours' lighting per year, the cost was 0.65 cent per lamp per hour. The first cost was \$1,935. If interest and depreciation at 10 per cent. be added to the cost of maintenance, this will be

come \$2,280.50. An idea of the economy of lighting by petroleum will be obtained from these figures.

The administration of the Belgian state railroads has made trials of different types of lamps with a round burner, having a double current of air and an hourly consumption of 2.1, 2.4 and 3.5 ounces of petroleum. There should also be mentioned trials made at Paris by the Western of France with the Lucigene lamp for burning tar oil (a residue from the manufacture of gas) enriched by oxygen furnished by a current of compressed air. Two sizes of these lamps were used; the larger type burns 488 cub. in. of oil per hour and has a lighting power of 1,984 candles; the smaller burns 122

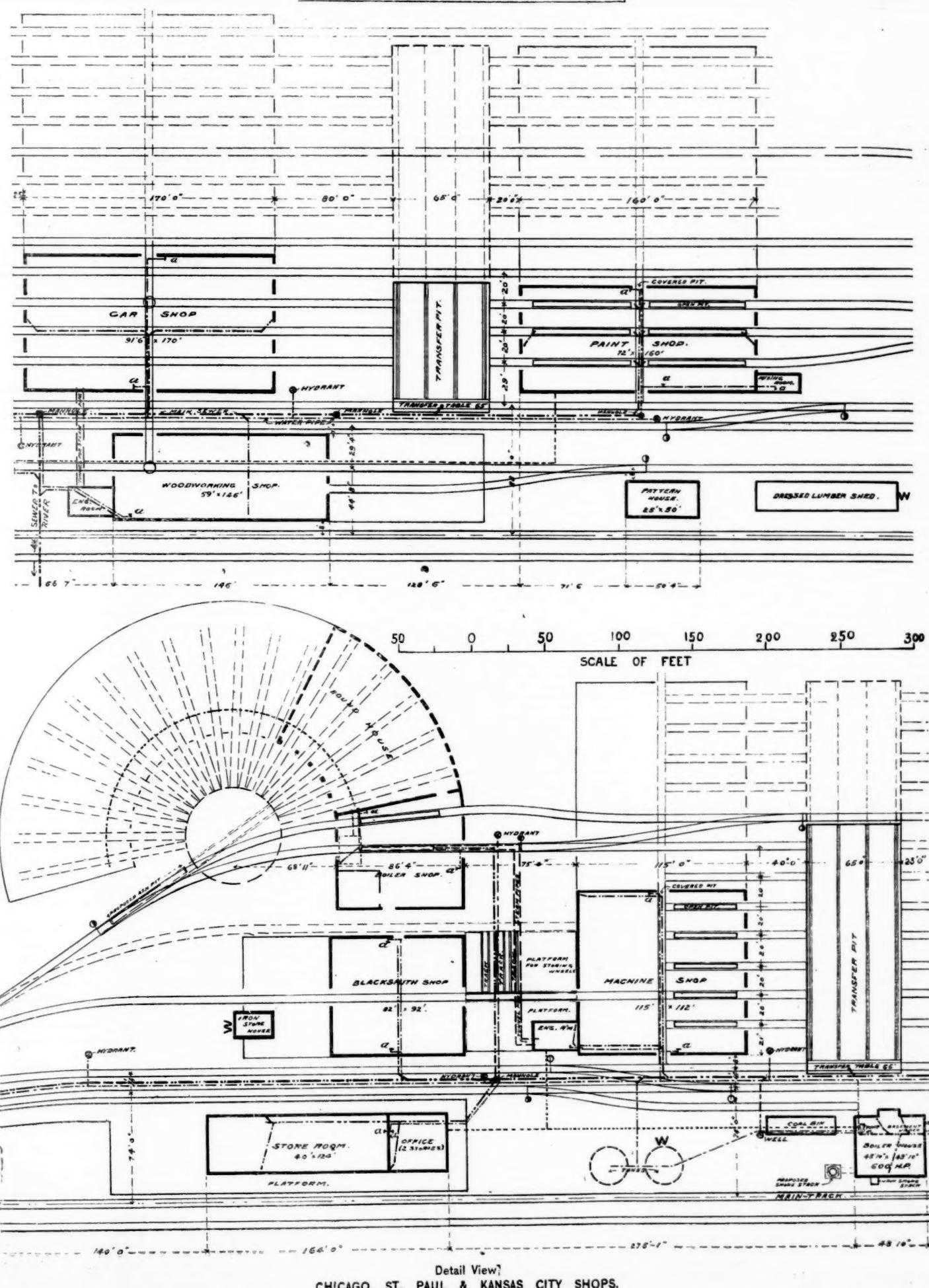
LAST PLATE OF 1 UN.	
BRICK BUILDINGS NOW BUILT.	
BRICK FOUNDRY HOUSE NOT BUILT.	---
PROPOSED EXTENSION OF BRICK BLDGS.	W
WOOD BUILDINGS NOW BUILT.	---
---	NOT BUILT.
STEEL PIPE TUNNELS NOW BUILT.	---
PROPOSED EXTENSION	
SEWER PIPES	---
WATER PIPES.	---
TRAILS LAID	---
---	NOT LAID.
FIRE HOSE MARKED -02-	

cub. in. of oil per hour and gives a light of 500 candles. (This apparatus is described in the January, 1887, number of the *Revue Generale des Chemins de Fer*.)

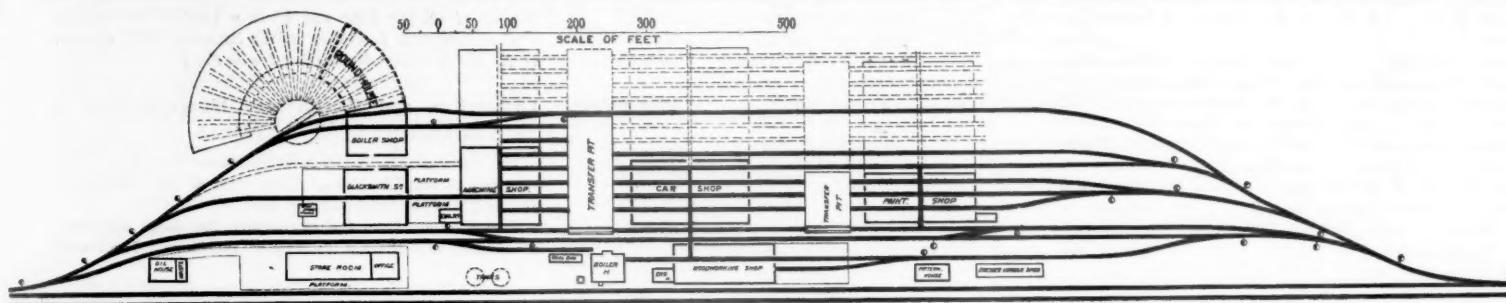
Locomotive and Car Shops—Chicago, St. Paul & Kansas City.

The accompanying illustrations represent the shops of the Chicago, St. Paul & Kansas City, built at St. Paul after the designs of the officers of that road.

As will be seen from the engravings, the shops consist of seven main and several subsidiary buildings. The round



Detail View
CHICAGO, ST. PAUL & KANSAS CITY SHOPS.



General View.

CHICAGO, ST. PAUL & KANSAS CITY SHOPS.

house, the boiler shop, the blacksmith shop, the iron machine shop, the car shop, the paint shop, the wood working machinery shop and the store room are all accommodated in separate buildings. The patterns, oil, coal, the boilers and the dressed lumber are all placed in small separate buildings isolated so as to be practically safe from fire.

The system of drainage, and water pipes, etc., are clearly shown and will be readily understood.

It will be observed that the shops are readily capable of extension, and the whole arrangement is very neat and convenient, and forms a good example of modern practice.

Standard Axle for 60,000-lb. Cars.

The following paper by Mr. C. H. Mead (Texas & Pacific) was read before the Western Railroad Club at the monthly meeting held Jan. 18, 1883 :

In looking over publications devoted to the interests of railroads, my attention is particularly called to the adoption of a standard axle for a 30-ton car. In all of the discussions it is generally conceded that a larger axle is needed for cars of this capacity. Surely it is of the greatest importance that no mistake be made in the adoption of a standard axle, the dimensions of which are now under discussion. The question naturally arises which is the easiest and at the same time the most economical way to accomplish this result. I think all will concede that experience has proven the wisdom of all who advocated the adoption of the present M. C. B. axle. The results obtained by its adoption have exceeded the expectations of its most sanguine advocates, and from an economic point of view its benefits have been incalculable.

Increasing traffic demands that cars be now constructed to carry heavier loads, and for the present we assume 30 tons to be the future load. The question now arises what are the dimensions of the axle to be to carry this load safely? At the present time, as at the adoption of the M. C. B. axle, a diversity of opinion exists, and it now rests with the majority to decide as to the strongest and best adapted axle for the purpose. To accomplish this result an axle has been proposed by Mr. Jacob Johann, Superintendent of Motive Power of the Texas & Pacific Railway, the peculiarity of which is the economical manner in which it can be applied.* But two numbers of the present form of construction are interrelated with, viz., journal boxes and bearings. The same box used with this axle will receive the M. C. B. axle, bearing and wedge. Its dimensions are as follows: Length over all, 6 ft. 11 $\frac{1}{4}$ in.; wheel seat, 4 $\frac{1}{8}$ in. diameter; journal, 4 $\frac{1}{8}$ in. diameter and 8 in. long; centre to centre of journals, 6 ft. 3 in.; in fact, is the same as an M. C. B. axle, but turned straight from back edge of dust guard bearing to the outer ends. This axle weighs rough, 412 lbs.; finished, 385 lbs. The following comparison between this journal and the present M. C. B. may be interesting:

	Lbs.
Weight of a 30-ton car, light, car now in service.....	28,650
Load, 30 tons.....	60,000
Total.....	88,650
Deduct weight wheels and axles.....	6,660
Actual weight on journals.....	81,990
Load on each journal.....	10,247 $\frac{1}{2}$
Load per square inch of frictional surface.....	282.92
Our standard wheels weigh.....	640
Johann axle finished.....	385
M. C. B. Axle.	
Weight of 20-ton car, light.....	23,000
Load, 20 tons.....	40,000
Total.....	63,000
Deduct weight of wheels and axles.....	6,120
Actual weight on journals.....	56,880
Load on each journal.....	7,110
Load per square inch of frictional surface.....	258.63
Wheels estimated at.....	580
Axle, M. C. B. finished.....	370

The object of the comparison is to show that with the increased size of journal and additional load the liability of heating is not materially increased and as compared with other proposed axles is less. It is urged that the increased speed with which the journal will travel owing to its increased diameter will cause heating. By reference, however, to the proceedings of the Master Car-Builders and Master Mechanics' conventions of past years, when the present standard was under discussion, it will be found that this phase of the question was brought up and thoroughly ventilated, with the usual diversity of opinion; but experience has proven that this fear was groundless and I think the same result will be obtained in the present case. For more than a year this axle and bearing has been running the tender of an engine on one of the fast limited trains out of Chicago and not the least indication of heating has been observed. A similar result has been obtained in other places where the axle has been used, as well as in all cases where it has come under my personal observation.

That the axle as designed is strong enough to carry its load safely is not questioned, with possibly the exception of increasing the diameter at the centre of axle to 4 $\frac{1}{8}$ in. It requires less expenditure of labor to prepare it for service than any of the proposed axles and the loss of material in turning is reduced to a minimum.

The ease with which this axle can be substituted for the present axle should commend it to the serious consideration of all, and it should be borne in mind that the end stop as used in this box would be equally valuable in connection with the present M. C. B. axle in preventing end wear of brasses.

* The axle and end stop and bearing were illustrated in the Railroad Gazette, July 29, 1887.

However, if any desire to take up lateral motion between face of hub of wheel and back end of journal box, they are not prevented from doing so by using this axle. A change of journal boxes is called for, and should the standard axle be continued or the Johann axle adopted it is plain that the parties using either will be benefited. The axle proposed puts the most metal where it is needed, namely, outside the hub of the wheel.

With due respect to all who may differ regarding this matter I would urge that if any error is to be made in the adoption of a standard 30 ton axle it should be made on the side of strength, for we all know that the tendency is rather to overload than underload cars when the nature of the freight permits. Therefore it is better to err on the right side than on the wrong.

Being an enthusiastic advocate of this axle on account of its perfect working under my immediate supervision, I have endeavored in the foregoing to give in a few words my reasons for thinking that it is the best, strongest and most economical way of accomplishing the result we are all wish to attain. I respectfully present them to the railway club for their consideration with the wish that they will be able to see the way clear to advocate the claims of an axle so simple, strong and which can so easily and cheaply be put in general use.

Foundry Design.

Strong high walls are best for a foundry, and lumber should not be used in construction, except where absolutely necessary. Any foundry worth building at all is worth building well. Speed, convenience and durability should be the chief aims in laying out a foundry plant.

Dry sand work will probably be in demand as long as the present system of working metals in a foundry is in use, and therefore provision should be made in building a foundry to produce this class of castings as cheaply as possible. Pits, either of iron or brick, must be built in some portion of the main floor, for the purpose of laying up loam work, and in many cases drying the same in place. The portion of the foundry set apart for loam molding should be incased with water-tight walls, and the bottom of this compartment should also be laid with water-tight material.

If the foundry is to be a large one, say 50 ft. wide and 200 ft. long, a space of 50 ft. by 70 ft. should be arranged at one end of the building for making all classes of loam and dry sand castings, and this whole space would be enclosed below the floor line, as described above. Within this space can be placed iron and brick curbs for special work, while the entire compartment can be filled in with molding sand.

For a foundry of this size, there should be four core ovens, three of which would be rectangular in form, of the following dimensions: one 12 ft. by 20 ft., one 8 ft. by 15 ft. and one 6 ft. by 9 ft. The fourth oven should be a circular one, 5 $\frac{1}{2}$ ft. diameter, and 8 ft. 6 in. high. The two largest ovens should be located and in direct connection with the loam moulding department, and the small rectangular and the circular ovens should be placed at the other end of the foundry, which is set apart for small castings, snap molding, etc. Assuming that the traverse crane system is adopted, a wide and a narrow traverser side by side are preferable to one wide and one extending the whole width of the building. The wide crane should be placed on the side nearest the cupolas, and the tracks extended 150 ft. from the loam molding end of the foundry, while the narrow crane should have its tracks extended 105 ft. from the same end of the building, or enough only to reach the cupola jib crane. The two large core ovens should have a railway track in each, connecting with the main track in the foundry, and each oven should have its own heating furnace. In the space not occupied by the two traverse cranes the most modern and convenient wall and jib cranes should be placed, arranged to swing under the wide traverse crane at several points in the length of the track.

The core ovens and cupolas should always set back clear of the main walls of the foundry, and should be located in separate compartments, with ample space around the cupolas, both on the ground and platform floors, these floors being composed of cast gratings.

The roof should be a riveted iron plate truss, carrying one-half of the load on the cranes by a suspended truck hung from the roof trusses, the other half being carried on the walls of the building. At the loam molding end of the foundry the traverse tracks there would be one central column placed under the central track, as at this point both cranes can be used in connection with each other, making a combined hoisting capacity of 22 tons, the wide crane being 14 tons, and the narrow one 8 tons capacity.

This foundry should have three cupolas, two being at or near the centre of the building's length, and the third should be placed conveniently near the end allotted to snap molding and other small castings. The small cupola should be able to melt 8 tons, and the two large ones combined, 25 tons for an afternoon's work. The power for driving blowers, flask-shop machinery, traverse cranes, power jib cranes, rattle, drop, etc., should be derived from an independent steam plant, located in a building connected to the main foundry. The boiler should be large enough to heat the foundry in the cold season, the lower or discharging ends of the steam coils being connected with a receiver and small air pump, to induce perfect circulation in all of the coils, and at the same time continuously free them from water.

The cleaning room should be directly connected with the main railway track in the foundry, and should be near the end in which the green sand work is done. This room should be provided with one good jib crane, and an endless overhead single track, with three traveling trolleys thereon.

The core making should be kept out of the main body of the foundry as much as possible; therefore a room of liberal size should be built in a central position, for the exclusive use of the core makers.

The pig iron lifts for the cupolas should all be hydraulic,

and the pumps operating these should act as fire pumps also. The flask making should be done in a building isolated from all others, and this shop be furnished with the necessary plain woodworking machinery. The drop for braking up old castings should always be operated by power, and there are many simple methods of doing this work.

The foreman of the foundry should have a room located near the centre of the buildings to be used as an office and testing room, for in this room there should be a standard testing machine. At each heat there should be a set of bars cast from each cupola, if the mixtures are different, and these bars should be broken by the foreman every morning after a cast. In this way a watch can be kept on the material, and if the quality is failing off the makers can be notified, thus preventing future trouble and expense.

Although it is necessary to have quite a number of patterns in the foundry at all times, yet, as a general rule, there are more patterns stored, as it were, in the foundry than there should be. There should be a system of removing a certain number of patterns every day to the fire-proof pattern loft, for it will pay in the matter of repairs as well as safety.

The arc and incandescent systems can both be used to advantage.—American Machinist.

Combined Door Spring and Check.

The accompanying illustrations represent a new combined door-spring and check well adapted for railroad stations, offices, etc., which has been recently introduced by the Russell & Erwin Mfg. Co., of New Britain, Conn., and New York. The operation of the device will be readily understood from our illustrations.

The frame A is fastened to the door casing, the bracket D to the door and the oscillating lever C, pivoted on the outer end of the frame A, is connected to the bracket D by the link E. One of the toggle arms of the spring G is pivoted to the frame and the other attached to the short arm of the lever by a flat link chain. The base of the air cylinder B and the end of the piston-rod are pivoted to the frame A and lever C respectively.

The piston is of the ordinary cup pattern with a valve in the centre.

This valve consists of the tapered end of the piston-rod fitting into a seat in the piston and is so arranged that when the piston is drawn backward the valve is opened, allowing the air to pass readily through the piston, but when the motion is reversed the valve is closed and the air compressed in front of the piston.

Provision is made for the escape of a small volume of air through the piston to allow a final slow-closing motion by means of a very small slot cut in the valve seat. The same size hole through any other part of the piston would soon clog up and become useless.

When the door is opened, the lever C draws the chain towards its pivot until engaged by the eccentric segmental drum around which it winds.

It will thus be seen that when the door is wide open the spring is at its maximum tension, while with the chain around the drum it imparts its minimum power against the door and consequently its first motion in closing is easy, accelerating somewhat as it proceeds, until checked by the air cushion in the cylinder. To overcome the resistance of the latch, wind pressure, etc., the greatest power is exerted by the spring against the door when it is at its least tension and the door is nearly closed.

These springs and checks are reversible for right and left-hand doors, and by a simple substitution of one bracket for another they can be placed on the other side of the door from that shown in the cut.

The check without a spring is provided for cases where a good spring is already in place, or where a cord and weight or its equivalent is preferred.

A check with a special heavy spring is made for car doors, and it is now extensively used on the Boston & Albany and other Eastern railroads.

TECHNICAL.

Locomotive Building.

The Southern Pacific is said to have contracted for 70 new locomotives.

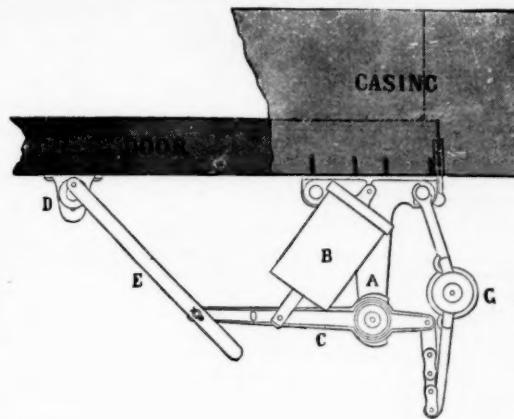
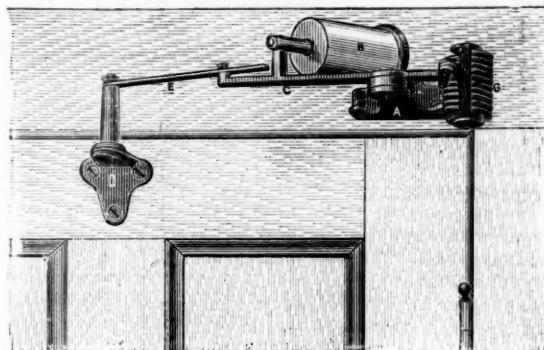
The California Southern has received 5 new Mogul engines.

The Rogers Locomotive Works, Paterson, N. J., have contracted with the New York, Lake Erie & Western for 15 consolidation locomotives, five of which will be for the New York, Pennsylvania & Ohio.

Car Notes.

The Connecticut River has recently contracted with the Wason Car Works for the construction of six passenger cars.

It is said that the Duluth, South Shore & Atlantic will have ten more locomotives and 500 new 25-ton ore cars added to its equipment this spring. It is also said to be



COMBINED DOOR SPRING AND CHECK.

Made by the RUSSELL & ERWIN MFG. CO., New Britain, Conn.

negotiating with the Baldwin Locomotive Works for 30 locomotives, 15 freight and 15 passenger.

The St. Charles Car Co., St. Charles, Mo., have just turned out five passenger coaches for the St. Louis, Arkansas & Texas.

It is said that the Cleveland & Canton has contracted for 700 standard gauge freight cars.

The Laconia Car Co. have contracted to build 200 cars for the Eastman Car Heater Co., and ten passenger coaches for the Boston & Maine.

The Erie Car Works (Limited), Erie, Pa., have contracted with the New York, Lake Erie & Western for 334 coal cars; the Lafayette Car Works, Lafayette, Ind., and the Bloomsburg Works, Bloomsburg, Pa., have each contracted for 333 coal cars; the United States Rolling Stock Co., Hegewisch, Ill., has contracted for 321 box cars for the same road, and the Roanoke Machine Works, for 150 box cars.

The Ohio Falls Car Works, Jeffersontown, Ind., are erecting a machine shop 80 x 250 ft. The company is expending \$20,000 in putting in improved machinery.

The Harrisburg Car Works have contracted to supply the Philadelphia & Reading with 500 hopper gondola coal cars of 50,000 lbs. capacity, to be delivered within the next four months.

The Philadelphia & Reading have lately received 70 new passenger cars.

Manufacturing and Business.

Gould & Eberhardt, Newark, N. J., have lately received orders for two 60-in. bolt cutters from Morgan, Williams & Co., Alliance, O., and Niles Tool Works, Hamilton, O.; also for a cutter of the same size for Betts Machine Co., of Wilmington, Del. They have sold 100 of their drill presses in the last two years.

Charles L. Wilson, Buchanan, Va., wants to purchase about 25 or 30 tons of second-hand iron or steel rails, either 18 or 16 or 12 lbs. per yard, with fastenings and equipment for a tram road.

The Foster Car Coupling Co., Newman, Ga., have organized with Lavender R. Ray, President; John R. Wilkinson, of Atlanta, Vice-President, and James H. Shelnut, Secretary.

The contract for building a new machine shop at Buffalo Creek for the Buffalo, Rochester & Pittsburgh has been let to Ransom Davis, of Springville.

At the annual meeting of the Russell & Erwin Manufacturing Co. the old board of directors were re-elected, and Henry E. Russell, Jr., was made Secretary and Assistant Treasurer.

The Waldumer Electric Brake Manufacturing Co. has been formed with a capital of \$200,000, and will equip a train of 25 cars at once to visit the different cities. Henry S. Fechheimer, John R. Selden, Emile Kahn, H. W. Morgenthaler and L. M. Hosea are the incorporators.

The Lorraine Car Coupler Co. has been incorporated in Illinois, with a capital of \$1,000,000. Incorporators, Wm. D. Wolcott, Madison J. Lorraine and Henry Braun.

The Erie Car Heating Co. has been incorporated in Illinois, with a capital stock of \$400,000. Incorporators, John M. Ormsbee, Pearl D. Hoyt and Elliott S. Rice; office at Chicago.

The New York Iron Roofing & Corrugating Co. have opened a branch office in Buffalo to meet the increased demand for their roofing materials. Mr. Chas. S. Woodward represents them with an office in Room 43, Chapin Block.

The Standard Oil Co. have commenced building large oil tanks at Duluth, and promise to supply the entire West and Pacific Slope from that point. Vessels expressly fitted for oil transportation will be employed on the lakes.

Westinghouse, Church, Kerr & Co., whose main office is at New York, have established a Western branch at 156 and 158 Lake street, Chicago, where they will conduct a general steam engineering business in connection with the sale of the Westinghouse engine and the Roney mechanical stoker and smokeless furnace. H. W. Longwell is the manager of the Chicago branch of the firm.

Four Corliss valve stems were recently finished off in the new milling machine built by Pedrick & Ayer, Philadelphia, in four hours.

D. A. Hopkins, 113 Liberty street, New York, recently made a contract with a car building company for journal bearings to be delivered the present year, which calls for about 250 tons of finished bearings.

The Chicago offices of the Dunham Manufacturing Co. have been moved to larger and more convenient rooms in the Phenix Building.

The American Electric Manufacturing Co. about a year ago established one of its plants at Mount Vernon, N. Y. The service has been so successful that they have increased their facilities, and are now lighting the town with 50 arc lights, requiring 300 poles and over 30 miles of insulated wire.

The McGuire Manufacturing Co. has received a contract for its grain door for use on 2,000 freight cars.

The Mexican National Railway Co. propose building new stations, shops and yards at different points on their line, and for this purpose Messrs. Theodore Cooper and Auguste Nau, engineers and architects, of No. 35 Broadway, New York, are making studies for plans. While it is probable that the iron for construction will be bought in Europe, there should, nevertheless, be opportunities there for American materials and tools.

Bridge Notes.

The Union Pacific railroad bridge across the Missouri at Omaha was opened Feb. 2. It is a combined highway and railroad bridge, with two tracks, and has cost over four million dollars.

The Atchison, Topeka & Santa Fe railroad bridge across the Missouri, at Sibley, Mo., which with its approaches is a mile and a half long, has been completed.

The Atlanta Bridge Co. has the contract for an overhead bridge for the Central, of Georgia, in Atlanta.

A bill was reported in the Senate Feb. 2 authorizing the construction of bridges across the Red River of the North, and across the Mississippi at or near Natchez.

The city council of New Orleans, La., will appropriate \$2,500 to build a bridge across the St. Bernard Canal.

The Owensboro & Indiana Bridge Co. are making the preliminary arrangements for their bridge across the Ohio River.

At the annual meeting the Berlin Iron Bridge Co., East Berlin, Conn., last week the following officers were elected: Charles M. Jarvis, President and Chief Engineer; B. K. Field, Vice-President and Treasurer; George H. Sage, Secretary.

The South & North Alabama has just completed a new iron bridge over the Alabama River, four miles above Montgomery.

The city and county of Wheeling voted Feb. 4 to subscribe \$300,000 to the capital stock of the Wheeling & Harrisburg Railroad for the purpose of building a union railroad bridge across the river with the needed approaches and a comprehensive system of terminal tracks. This vote not only secures the bridge, but affords entrance to the city for a number of important railroads. A new line to the Connellsburg coke fields and another to Bowerstown, O., are included in the plan.

The New York, Providence & Boston has issued orders to prepare the plans and estimates for the immediate letting of the bridge across the Thames at New London. The bridge will have a draw span of 500 ft., flanked by spans of 310 and 150 ft. respectively. The estimated cost is about \$750,000.

Iron and Steel.

The Homestead Steel Works of Carnegie, Phipps & Co., Limited, at Homestead, Pa., have resumed operations in all departments.

The Pittsburgh Forge & Iron Co., of Pittsburgh, have just completed some very important additions and repairs to their works, and will begin the manufacture of steel axles in a few days.

Lloyd, Booth & Co., proprietors of the Falcon Foundry & Machine Works, at Youngstown, Ohio, are making for the Sharon Iron Co., at Sharon, Pa., two housing and bedplates for a 22-in. sheet train.

The Kellogg Seamless Tube & Manufacturing Co., of Boston, are engaged in erecting their works at Findlay, Ohio. It is proposed to have their first machine for rolling seamless steel tubes made by the M. C. Bullock Manufacturing Co., at Chicago.

Birmingham ironmasters regard the completion during 1887 of the Kansas City, Memphis & Birmingham as a very important factor in the trade of Birmingham, Ala., as it gives them an outlet for pig-iron, bars and sheets into Kansas.

The Sharon Iron Co., of Sharon, Pa., are building two additional gas producers and two regenerative heating furnaces, also two trains of rolls.

The property of the River Iron Works Co., Roanoke, Va., was sold last week at auction to Clarence M. Clark, of Philadelphia, for \$36,000.

The 10 per cent. reduction in wages ordered by the Pittsburgh Tube Works has been withdrawn, and work has been resumed at the old wages.

At the annual meeting of the Springfield Foundry Co., of Springfield, Mass., the following directors were elected: Joel B. Harris, of Rutland, President; Edward W. Seeger, Treasurer; William A. Harris, Secretary; Nelson C. Newell and Charles P. Harris.

The Southern Foundry Co. and the Alabama Iron Works, of Birmingham, Ala., have consolidated as the Alabama Iron Works.

The Britton Iron & Steel Co., of Cleveland, O., was set on fire last week by crude petroleum used as fuel, causing a loss of \$50,000; insurance, \$45,000.

The Drouillard Iron Co., of Nashville, contemplate building a narrow gauge railroad 8 miles long if the Louisville & Nashville will not extend its Clarksville & Princeton branch to Cumberland Furnace.

The North Chicago Rolling Mill, at South Chicago, resumed operations last week, after being closed for more than two months while repairs were being made.

The Union Steel Co., of Chicago, Ill., is putting into its steel works a liquid fuel plant to use crude petroleum.

Messrs. Henry Disston & Sons, of Philadelphia, are erecting a plant to supply its shops with fuel gas made by the Loomis process.

The Stannard Iron Works, Minneapolis, will remove their works to West Superior, Minn.

The rolling mills at Bessemer, near Pueblo, are turning out rails for the standard gauge on the Rio Grande between Pueblo and Leadville. The contract will be completed early in February, and another will likely be undertaken for the road to Salt Lake and Ogden.

The Western Forge & Tool Works, St. Louis, have taken several orders for track tools for the Missouri Pacific.

American Institute of Mining Engineers.

The fiftieth meeting of the Institute will begin in Boston, Feb. 21, and is to continue till the evening of the 24th. As usual various excursions are to be made to places of interest.

The following are some of the papers announced: Spirally Welded Tubing, by J. C. Bayles; Western Kentucky Coals and Cokes, by Joseph H. Allen; Steel Rails, by Frederick A. Delano; The Thermal Properties of Slags; The Russell Process in Its Practical Application and Economical Results, by Ellsworth Daggett; Recent Developments in the Open-Hearth Process, by Alfred E. Hunt; The Huskgavel Furnace for Making Malleable Iron, by F. Lynwood Garrison; The Determination of Silica in Cinder, by R. H. Lee; A Method for the Estimation of Manganese in Steel, by Frank Julian; A Glossary of Furnace Terms, in English, French and German, by Thomas Eggleston; Prominent Sources of Iron Ore Supply, by John Birkinbine.

National Bureau of Harbors and Waterways.

Senator Culom has introduced in the Senate a bill to provide for a Bureau of Harbors and Waterways, to be officered by a corps to be known as the Corps of United States Civil Engineers. This bureau is to be under the authority of the Secretary of War and is to be charged with all the harbor and waterway works of the United States, with supervision of all crossings of navigable waters and with the making of all surveys, plans and estimates relating to harbor and waterway improvements. There are to be a chief engineer of the corps, 4 associate chiefs, 9 to 11 department engineers, not to exceed 50 division engineers, not to exceed 100 first assistant engineers, second assistant engineers not to exceed 200, and a number of cadet engineers, not to exceed 250. The chief engineer may be appointed from the present Corps of Engineers of the army, and shall not be of lower rank than colonel. The other engineers also, in certain proportions, may be taken from the Corps of Engineers, according to rank, as specified in the bill. Vacancies are to be filled by promotion from the lower grades, except that one-third of the vacancies occurring in any one year in the ranks of first and second assistant engineers may be filled by appointment from outside the corps. Examinations are to be made for promotion. The relative rank of each grade below that of Associate Engineer shall be determined by date of commission. The pay per annum of the various officers is as follows: Chief Engineer, \$10,000; Associate Chief Engineers, \$7,000; Department Engineers, \$6,000; Division Engineers, \$4,000; First Assistant, \$2,700; Second Assistant, \$1,800; Cadet, \$1,000. Actual traveling expenses will be allowed when traveling under orders. Officers of the corps are to retire at 65 on half pay. The bill provides for a commission to formulate a system of rules and regulations for the administration of the duties of the corps.

Meeting of Wire Nail Makers.

A meeting of the National Association of Wire Nail Manufacturers was held recently in Cleveland. About a dozen of the largest mills in the country were represented. W. H. Hartman, of Beaver Falls, Pa., is President of the Association, and C. D. Jones, of Brooklyn, N. Y., is Secretary. When asked whether the meeting had been called for the consideration of prices, a member said: "No, they are too low now. In the past whenever we have discussed prices it has only resulted in reducing them. We shall consider some details in the method of manufacture, but there will be nothing which can be given to the public."

The Paris Exhibition of 1889.

Industries states that as it is still commonly believed that exhibitors will have to pay a rent for the space occupied by their goods, the authorities have publicly announced, for the third time, that no such charge will be made. Exhibitors will, however, have to pay their share, that is, proportionately to the space they occupy, of the costs of the installation, and the decoration and care taking of the building. The chief director has determined the general types of the installation for each group, which, while allowing a wide scope for variations in the decorations, will entail on the exhibitors much less expense than they were called upon to bear in 1878. The Eiffel Tower, the erection of which is being pushed on without intermission night and day, Sundays and week days alike, has now reached a height of 160 ft., where the first floor, to be used as a restaurant, is being constructed.

Consolidated Railway Telegraph Co.

Under date of Jan. 18 the trustees of this company make a report to the stockholders. The report states that about Sept. 1 a short line was completed on the Lehigh Valley Railroad, and has been in operation without cessation since that time on six daily passenger trains, and the system has been repeatedly used also on freight, construction, wrecking and inspection trains. It is said also that the officers of the railroad company "are rapidly increasing the principal uses to which our system can be applied, and greatly reply upon the facilities which it affords." The company is in correspondence and negotiation with various railroad companies, and the trustees believe that several railroads will be induced to place the system on their lines during the coming summer. The office of the company has been moved from 13 Park Row to 115 Broadway.

Minerals on the Mobile & Ohio.

Several valuable minerals have been found along the line of the Mobile & Ohio within the last few years. White flint or chert has been used for ballast very successfully on 45 miles of track, and 50 additional miles will be ballasted with white flint during the ensuing season. Quartzite is also being shipped from Elco. Various kinds of clay or petunse are extracted from Kaolin and small quantities of asphalt are also found there. The beds of marl near Corinth, Miss., are being actively quarried and are used largely for manure by fruit growers in Illinois and elsewhere.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS OF railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Sub-Committee of the Master Car-Builders' Association has submitted the proposed lines of the standard freight car coupler to the Eastern and Western Railroad Associations, in order to ascertain the legal aspect of the question and the position as regards the claims of patentees on this point.

A car-coupler inventor writes us protesting against the use of extra long deadblocks with the proposed standard M. C. B. coupler. It is a little difficult to see why the representative of a car coupler should complain about a matter that does not interfere with the coupler in any way, except to give it plenty of room, and so permit ample strength to be secured. As a matter of fact, it is physically impossible to make a vertical plane coupler of the M. C. B. type which can at once be strong and be efficiently protected by deadblocks which project only 6 in. from the end sill against which the draw-head butts. Any idea that 9 in. deadblocks are to be adopted so as to specially favor the Janney coupler is ill-founded. This distance is a fair average of that required by the different vertical plane couplers now in the market and a shorter deadblock would be practically useless, as it would not save the coupler from the full effect of heavy blows in switching, etc.

The suit between the rival sleeping car companies as to the right to use vestibules between the cars has ended as might be expected. The use of vestibules was declared old, as they have been used to some extent on passenger trains in the United States, Russia and elsewhere for over 20 years, and between postal cars in Great Britain for an even longer period. The novelty of the Session's patent lay not in making a weatherproof and flexible passage between adjacent cars, but in combining such a passage with buffers placed near the plumb of the roof, so that the friction between these buffers lessened the rolling motion and oscillations of the cars. The buffer feature of the vestibule will therefore be abandoned by the Wagner Sleeping Car Co.

January gross earnings have been reported by 35 railroads. Ten of them show a decrease from last year, while the greatest increase among those which have not increased their mileage is 33 per cent. In the aggregate the gains in earnings are over 4 per cent. The roads which have reported are generally the smaller ones, and from the central group, where the effects of the storms have been least felt. Among those roads the gains have been nearly 7 per cent. Seven roads which have reported from the Northwest show a gain of 0.2 per cent. over January of last year in earnings, but the increase in miles operated is nearly 15 per cent. It is evident that there will be a serious falling off in the regions of the great January storms, but there is a reasonable prospect that the country at large will show gains for the month.

The situation among the lines west and northwest of Chicago, as chronicled in our traffic columns this week, is such as to give little hope of the restoration

of remunerative rates for some time to come. The severity of the reductions and the wide extent of country covered render the prospect of an agreement on any course of action very unpromising. While the opening of the Minneapolis, Sault Ste. Marie & Atlantic is made the occasion of the hostilities among the Chicago-St. Paul lines, it is quite apparent that they have been waiting for a good chance for a tussle with each other, and the newer lines apparently will not be ready for any agreement until they have made a vigorous attempt to show by actual tonnage that they are entitled to a good share of the business. The Sault Ste. Marie route in connection with the Canadian Pacific, Rome, Watertown & Ogdensburg, and New York, Ontario & Western forming an independent line through to the seaboard, the trunk lines have been drawn into the contest almost necessarily, though their participation thus far seems to be confined to the slight reduction (from 75 to 70 cents first class) in the New York-Chicago proportion of the through rate to St. Paul, which was inaugurated by the Pennsylvania; and there would seem to be no immediate reason for their being very badly scared. The new line has but limited facilities as yet, and has obvious disadvantages, especially in winter, and the business is not a large share of the trunk lines' total in any event.

The war west and southwest of Chicago is complicated by the Illinois and Nebraska state limitations on local rates and by the expectation of adverse legislation in Iowa, while the new lines between Chicago and Kansas City also make the situation, aside from this consideration, quite as unsatisfactory as that in the Northwest. On all sides the long and short haul law knocks out a good many props which were formerly relied on as supports in a fight, so that on the whole a large shrinkage in earnings for a month or two seems certain. But traffic of many kinds is now at its dullest season, and it is to be hoped that such questions as can be decided by showing what percentage of traffic one road can draw away from its neighbors will be speedily settled, and traffic men who feel that a "question of honor" is involved should realize that duty requires them to come to some agreement before a rush of business renders their expensive duels any more expensive.

Dispatches of the 7th, from Ottawa, announce the arrival by the Canadian Pacific of the first through mails for ten days. It is said that the traffic of the Canadian Northwest is practically paralyzed. Complaints have been heard for some time from Manitoba that a great quantity of wheat is held there for want of transportation. Nevertheless, the Canadian Pacific reports a gain of about 25 per cent. in January gross earnings over 1887, with an increase of but 3.2 per cent. in miles operated. The comparison is with a month in which the road suffered badly from blockades by snow, but the increase is large enough to be pretty good evidence that the rolling stock has been kept busy, and it is not improbable that the road has been unable to move the crop of the year east as fast as would have been desirable, and it is altogether likely that freight has often accumulated at various points, both from the winter delays of traffic, and for lack of equipment. Preliminary estimates put the wheat crop of Manitoba and the Northwestern region at about 7,000,000 bushels, but it is now said to have been nearer 11,000,000. Therefore it is not surprising if the company finds itself embarrassed by lack of cars and engines. It is not easy to know the exact truth in regard to these stories and complaints of blockades and delays, but in considering them it must always be remembered that there are many people in Manitoba and elsewhere whose interest it is to make them as unfavorable to the Canadian Pacific as possible. It is known that the road is taking measures to increase its equipment very largely. Another Autumn will find it prepared in that way to handle the northwestern crop more promptly.

In the notes of decisions in this issue will be found two cases bearing on the liability of a railroad for the death or injury of persons walking on its tracks. The cases were both in Indiana. One of them at least was not a case of tramps, but of a woman who chose the railroad track as a more convenient and agreeable path than the muddy street adjacent. The Supreme Court rules that a person walking on a track is a trespasser, and that the company is not liable unless willful negligence on the part of the engineer can be proved. It is not enough to prove that the engineer was signaled to stop; but to establish negligence it must be proved that he saw the signal. How difficult this

would usually be can be imagined. Such decisions must help, be it ever so little, to reduce the number of trespassers on the track, and the terrible loss of life and limb resulting from that form of insanity. They tend slowly to build up a correct public opinion. They help to fix the status of the casual track-walker as a trespasser, and to take him out of the category of innocent, law-abiding citizens who may expect a bonus for tempting Providence.

RAILROAD CONTROL AND RAILROAD MANAGEMENT.

By a recent decision in Ohio, public attention has been called to some of the wrong financial methods employed by those who control railroad property. According to the statement of the Court, Judge Stevenson Burke and his associates, having obtained control of the Columbus, Hocking Valley & Toledo Railroad, proceeded to mortgage the property to a large amount, nominally for the purpose of improvements, but really to secure the cash for certain financial operations in which they were themselves interested. An injunction has been obtained which restrains them, for the time at least, from using the issue of securities for such purposes.

If the facts are as stated, this decision will be welcome to all who are interested in sound and honest railroad management. It is in the same line with the decision of Judge Gresham in the Wabash Receivership case a year ago; it goes to protect legitimate against illegitimate interests. The more such decisions we have the better. No inconsiderable part of the evils and abuses in American railroad management can be traced to practices like those which this decision is designed to prevent.

We do not propose, while the evidence before us is so incomplete, to enter into the details of this specific case, but to trace, in a more general way, the connection between the financial condition of a railroad and the principles which govern its management.

It is not so simple a matter as is commonly supposed. The connection is an indirect rather than a direct one. It is a common belief that fictitious capitalization and other similar operations of inside rings cause shippers to be charged higher rates; that the railroad managers and railroad agents tax the public in order to pay dividends on watered stock, and are prevented from making reductions in rates which they would make if the road had not been burdened with more or less fraudulent fixed charges. Now every railroad man knows that this is by no means the real state of the case. The capitalization of the road is the last thing a man thinks about in considering the question of rate reduction. If the proposed change is likely to develop new business in such a way as to increase gross income faster than it increases operating expenses he will make it; and not otherwise. He is trying not to get a certain amount, but to get all he can. If an honestly managed road makes low rates, it is because higher rates would check traffic, not because the road is a benevolent institution; and higher rates would check traffic and diminish net earnings just as much on a road which was capitalized at \$200,000 a mile as on the same road if it were capitalized at \$50,000. In the former case there would be but a small dividend per cent., and in the latter a large one; but the best attainable result, whether it be satisfactory or not, is got by making rates suited to the character of the road and the amount of traffic obtainable without regard to the nominal valuation.

In point of fact, when we compare the different railroads of the country we find, as a rule, that similar roads make similar charges, whether their stock has been watered or not; that roads with higher capitalization have, on the whole, very much lower rates per ton mile than those with low capitalization, showing that it is low operating expenses and large volume of traffic which make the difference and not the capital account, or the fixed charges. We also find that the attempt to insure reduction of rates by limiting the amount of dividends has proved a complete failure; that as far as it has had any effect, it has prevented reductions in rates by depriving a company of inducements to develop traffic.

But though a railroad company does not habitually arrange its rates for the purpose of earning some pre-arranged dividend, it does habitually arrange its accounts with that idea in view. If the managers wish to pursue a conservative policy, and do not care to divide all that they have earned, they swell the charges for repairs to the utmost, thus arranging to pay out of earnings for many things which are really in the nature of permanent investment. If on the

other hand, they wish to make the sum available for interest or dividends as large as possible, they make the current charges for repairs as small as they can and charge all doubtful matters to new construction. There are so many cases of real doubt as to the boundary line between construction and maintenance, that this process may be carried very far in either direction without much actual dishonesty. In an examination made by the Massachusetts Commissioners some twelve years ago it was found that in the accounts of the New Haven & Northampton road the locomotives were credited at an average of about \$12,000 each, while similar locomotives on the books of the Boston & Providence stood at less than \$5,000. No imputation was cast on the honesty of either set of officials; but those of the Providence road had allowed for depreciation and paid for all improvements out of current earnings, even when they involved the substitution of new locomotives for old, while the officials of the Northampton road had pursued the opposite policy in both these respects. As another instance, the Pennsylvania charges at once against its general profits in each year the losses which it incurs in operating its leased lines. The Baltimore & Ohio, on the other hand, allows losses on its leased lines to stand and accumulate, and calling them an asset, adds to a so-called surplus. How, then, shall shareholders know that moneys divided amongst them are really earned? The ease and convenience of these manipulations commend them too often to railroad managers who wish to make a favorable showing to influence the current values of the securities of their company.

As long as the directors really represent the investors these manipulations will not ordinarily make very much difference in the general policy of the road. But the moment there comes a board of directors with interests other than those of the investors, there is a change in this respect. From not paying for an improvement it is but a short step to not making it. This interferes with the permanent efficiency of the property; but it makes the year's accounts look better, and there are too many boards of directors who care ten times more for the account than for the property—ten times more for the speculation immediately in hand than for the permanent interests of either investors or anybody else. This is the first direct difference in railroad economy which is felt as a result of honest or dishonest finance. A road with an unwatered capital account and directors who really represent the property is far more likely to pursue a far-sighted policy in the matter of improvements than one which is burdened with fictitious obligations or speculative directors. And in extreme cases when the saving of a few thousand dollars will enable an inside ring to retain control for a year longer, such a ring will sometimes postpone repairs and improvements, which are demanded on grounds of public safety as well as public policy.

This condition of things will prevail, to greater or less degree, where the control of railroad proprietorship is vested in autocratic hands or in combinations of great capitalists. A divided and permanent proprietary will doubtless lead to a corresponding improvement in the representation; but of all present evils in directorship the most to be deprecated is one where the board though nominally representing the shareholders will be found on analysis to actually represent bondholders or creditors of the company. Such cases are by no means infrequent, however great the apparent anomaly of the representation selected from an interest in its nature diametrically opposed to every interest of the shareholders.

The same short-sighted principles are sometimes applied in the matter of rates. Not that the general scale of charges is either higher or lower, but that the artificial inequalities are greater. A railroad which is managed with due regard to the future as well as to the present, applies the principle of charging what the traffic will bear in an intelligent way. Its officers see, or ought to see, that the attempt to charge high local rates and low through rates, or high rates to small shippers and low rates to large ones, is simply suicidal. Such a policy destroys a road's best customers, and favors a class of traffic which is liable to go by some other route the moment any special inducements are offered. But if the property is managed by those who care comparatively little for its permanent interest, the likelihood of such discriminations is much greater. If the authorities simply care to make as good a dividend as possible for the current year, it is probable that they will tax the non-competitive traffic to the utmost, and attract competitive traffic by every possible inducement in the way of low rates and special favors. And they too often have the power, by this short-sighted or irresponsible management, to force a simi-

lar policy upon competing roads even against their will.

We are not dealing with the worst instances of ring rule, where the managers deliberately undertake to plunder the legitimate investors, but simply with the normal results of giving control of the property to men who have but a temporary interest in connection with it, or who will manage it for the current instead of the permanent results. We see how, without absolute fraud on anybody's part, a road which is thus burdened is liable to neglect permanent improvements and pursue a short-sighted policy with regard to rates. But this is not all. Such action is likely to lead to reprisals on the part of the government.

Political rings are quite as common and dangerous as railroad rings. It too often happens that the government is in the hands of those who do not, in any sense, represent the permanent or the legitimate interests of the country; men whose object simply is to stay in power as long as they can, and make what they can out of the business. The supposed conflict of interests between the railroads and the public is, to a large extent, the creation of these men. Short-sighted management of railroads leads to mistakes of which they are only too ready to make political capital. A certain set of shippers feel that they have a grievance. It may be due to some action of the railroad management which hurts the investors as much as the shippers; but it suits the politician's purposes to represent it as a conflict between corporate power and personal freedom, and himself as the champion of the latter. A measure is framed avowedly as a means of regulating railroad charges, but really as a means of bettering the chances of its supporters for political preferment. The great majority of railroad laws may be described as remedies which would never work, against grievances which ought never to have been allowed to arise. Grievance and remedy were both the work of interested parties—a railroad ring which cared little for railroad economy, and a political ring which cared still less for political economy.

Any decision which interferes with the powers of manipulators for the protection of legitimate interests is welcome, not merely for the direct good which it does, but for its indirect effect in every direction. It decreases the chance that railroads will be managed shortsightedly, either in their expenditures or their receipts; it diminishes the danger of hostility on the part of the public, and of hurtful legislation based on such hostility. The permanent interests of the railroads and the public lie very close to one another, and the permanent interests of both parties are served by any process which tends to check ring rule in either party.

Buffer Brakes.

It is somewhat surprising that a buffer brake should be tried on a large scale after the exhaustive and, to most people, conclusive trials at Burlington in 1886. While no one can deny that an independent buffer brake that will stop a train in a reasonable distance and act without destructive shocks, possesses obvious advantages over a brake that requires each car in the train to be fitted with perishable rubber and sensitive valves, yet it is equally obvious that we can pay too high a price for a brake that will always be operative whether every car be fitted or not.

The many serious objections to buffer brakes is doubtless the reason for their general non-adoption. The peculiar and special disadvantage of buffer brakes has been clearly demonstrated. The careful trials at Burlington showed that with long trains violent shocks are inseparable from buffer brakes, which are applied and released at every slight change of speed or movement of the drawbars. It is obviously impossible to work a long train without some action of this sort, and therefore all hope of perfecting buffer brakes has been very generally abandoned.

All buffer brakes hitherto introduced appear to possess the following serious defects:

1. The shocks in long trains are inadmissible.
2. Buffer brakes are non-automatic, in the sense that the brake is not self-acting when the train parts.
3. Buffer brakes cannot be graduated.
4. Buffer brakes cannot stop a train in less than about double the distance required by a continuous brake.
5. They cannot be applied by the conductor from the rear of the train.
6. Or with full force from any part of the train, except the engine.

Some buffer brakes also possess the following serious practical defects:

7. The brake cannot be used in backing.
8. A pusher cannot be used up a steep grade.

It is claimed that the buffer brake, illustrated on another page, does not give shocks, and that it applies itself automatically when a train parts. It seems a pity that these facts were not established by a complete and scientifically conducted trial at Burlington with a regular long freight train. Some trials have been made near Boston with 15 cars, a number utterly inadequate to test the merits of any modern freight train brake. In the absence of any explanation as to the mechanical means by which shock is avoided and automatic action secured, some further trials seem highly desirable, especially as the drawings, while showing the detailed construction of the brake, do not reveal the means by which automatic action is obtained. It is, in fact, difficult to see how it is mechanically possible to render a buffer brake automatic.

Automatic action has two valuable features, first the brakes are applied whenever the hose or other continuous feature fails; and secondly, the brake is applied whenever the train breaks in two. The former is unnecessary with a buffer brake, as it needs no connection between the cars. But the second point in automatic action is very essential in freight trains, which are, and probably always will be exceedingly apt to break in two at awkward and unexpected moments. The destructive force of the collisions which frequently result are only too well known. It may, therefore, be laid down as an axiom that a satisfactory freight brake must come automatically into action whenever the train breaks in two.

One objection which is frequently raised against air and vacuum continuous automatic brakes is their complexity. But it must be remembered that the delicate valves and apparatus in these brakes are effectively protected from dust, mud, ice and snow. Actual practice has shown that these elements cannot be disregarded in railroading, and that levers, clutches, friction pulleys, etc., are very apt to become frozen or rusted up, and inoperative. A friction wheel coated with ice is a serious source of danger and has in actual practice caused several collisions in the far milder climate of Great Britain.

Passing from the mechanism by which the movement of the buffer is made to apply the brake, it may be well to consider the action of a friction wheel driven from the axle and winding up the brake chain. As the car wheel revolves this chain is wound up, and the brakes are fully applied. But this takes place long before the train is stopped. It is evident that a point is soon reached at which either (1) the chain or brake rigging must break, or (2) the friction wheels must slip, or (3) the car wheel must skid. The first alternative, the breakage of a brake chain at every stop, would be highly inconvenient, to say the least of it, and must be prevented at all hazards. If the friction wheels slip, we know, from Capt. Douglas Galton's experiments on the Westinghouse brake on the London & Brighton, that the co-efficient of adhesion or friction instantly falls to about one-tenth of that available with rolling contact. The result, therefore, of any slip between the friction wheels would be that the force with which the brake is applied would be suddenly and enormously diminished, and that, as the co-efficient of friction between the rubbing surfaces of the friction wheels increased, the brake would be re-applied with increased force.

This action has always taken place in every chain and friction wheel device invented since they were first used by Loughridge on the Baltimore & Ohio over 30 years ago. Chain brakes are always rough in action and the explanation is to be found in the sudden change of the co-efficient of the friction, for it is easily understood that a brake which is hard on one moment and nearly released the next will jerk a train if composed of only one car. Add to this rough action the shocks due to the sudden application and release of the brake, owing to the movements of the draw-springs, and the fearful shocks experienced at Burlington cease to be a mystery.

The other objections to buffer brakes need little comment. The impossibility of using the brake in backing is a very inconvenient defect, but has been overcome in some forms of buffer brake. The inability to use a pusher is another practical defect that would cause a great deal of inconvenience in operating.

It is very improbable and hardly possible, that some inventor, more ingenious than his many predecessors, may invent a buffer brake that will be automatic, simple and free from the jerks due (1) to the irregular movement, and (2) to the varying coefficient of friction between the friction wheels. When this feat is accomplished, and not till then, buffer brakes will

stand a fair chance of general adoption for freight service. Careful and accurate trials with long trains can alone show if the inventors of the buffer brake that is now being tried on a large scale on the Boston & Albany can substantiate their claim to possess a buffer brake that fulfills the above conditions.

The Duplicate Order System.

In another column will be found a communication on the use of the duplicate order system in train dispatching. This letter is from an experienced superintendent, and the main question propounded is: Can it be made an inflexible rule to never infringe on a train's rights without first getting the consent of the engineman and conductor from whom the rights are taken? "Superintendent" assumes that the Time Convention Committee think the rule cannot be so adopted and that the *Railroad Gazette* agrees with them. But it is to be remembered that this committee's conclusions do not embody the ideal standard, but simply the highest attainable standard, taking things as they are. "Superintendent" assumes that dispatchers can be trusted, but that operators cannot, always. Quite likely the committee took the ground that dispatchers as well as operators are often much less alert, careful and intelligent than they ought to be. At all events that ground should have been taken if it was not, for it is a fact that many superintendents have dispatchers whom they regard as very considerably below the standard they would like to have them attain. The *Railroad Gazette* did not intend to condemn "Orders" practice, nor indeed to utter a decision either way; but simply to point out that the difference in favor of it seemed hardly sufficient to warrant taking issue with the committee.

A chief object of the duplicate order system is to avoid anxiety on the part of dispatchers, and consequent tendency to confusion in their minds. Sending advance orders violates the duplicate principle in that it tempts dispatchers to use differently worded orders to cover the same subject or to protect the same movement. Every movement made by a dispatcher outside of the strictly duplicate system makes a disproportionate addition to his cares. The chief aim of the committee undoubtedly was to adopt the duplicate order system as completely as possible. With this end in view various advantages had to be sacrificed; and it appears that it was deemed best to sacrifice this one among the rest. The possibility of regulations being violated by trainmen no doubt had an influence on the minds of the practical men of the committee; and to those of them who allow trains to sometimes accept a white signal in place of a clearance card or order, the chance of such a violation occurring in a case of this kind, doubtless was very real. Moreover, the sending of two orders to the ruling train at the same station would not be an uncommon occurrence, and the delivery of one of them alone would fulfill the previous command to get an order of some kind.

The placing of the qualifying clause in rule 510 should not be condemned. As has been repeatedly pointed out, there were a number of controversial points which the committee could not possibly reconcile; being unable to make rules that would be acceptable. The next best thing was to agree upon a code which non-conforming superintendents could adapt to their individual tastes with as few changes as possible. The bulk of the rules are satisfactory to the most captious objector, probably; if he can adopt the code in its main features without tearing it all to shreds where he dislikes it, a point has been gained. As rule 510 now stands, the change proposed by "Superintendent" can be made in it without troubling any one. Simply erasing a few words does it. No superintendent, however, should add to or take from the uniform code without plainly indicating the change and its nature. The making of your code easy for men who come to your road from another may not be a very important feature in many cases, but it is not by any means beneath notice. In several cases the committee felt obliged to insert rules which could not possibly be adapted to all employés without slight changes. Such, for instance, are those directing that such and such things be done "if desired." Of course they did not intend that all these points should be left to the choice of every brakeman and fireman.

If the necessity for additional facilities and better men is the only thing to prevent making the rule absolute, the clause "whenever practicable" should most certainly be expunged from rule 510 by every road which can afford to do it; and we believe there are few which can afford not to; but that the average dispatcher is enough better in his sphere than the average operator is in his sphere, to warrant the general employment

of advance orders for the purpose of attaining this end we are not prepared to say. From the existence of this provisional clause, and from what we learn of the views of conservative officers, we are led to believe that there may be obstacles which the expenditure of money cannot remove. It is to be remembered that the deliberations of the Time Convention Committee have not settled this question, and that men who have convictions which do settle it (in their own cases) have still a duty to give utterance to those convictions. Men who, like "Superintendent," feel that the committee was too timid, are bound to bring forward their arguments in detail; and on the other hand, those who sustain the committee should give their reasons for so doing. We should be glad to hear from either class. If the gentlemen of the committee had been tenfold wiser and more eminent than they were their conclusions could not have been expected to find full acceptance everywhere without more detailed explanation of their motives and reasonings; this the discussion at the Time Convention did not give.

Some Effects of the Vestibule Buffers.

It is well known that the use of equalizing levers not only lessens the motion of the car body, but also equalizes the weight on individual wheels. Thus not only is comfort secured by the easier riding of the car, but the more even distribution of weight on the wheels and axles relieves them of excessive strain and so promotes safety. It might be hastily assumed that any means of improving the riding of a car is equally beneficial in relieving the axles and wheels of excessive strains.

The principle of using equalizing levers, if not American in conception, has been most largely applied in this country, and is, of course, most applicable to vehicles having eight or more wheels. In Europe where four-wheeled cars are still general, equalizing levers were obviously of little use, and the violent oscillations of the short cars used were checked by forcibly screwing the various vehicles together into nearly a solid train. The friction between the buffers of adjacent vehicles limited the independent oscillations of each vehicle, and if one car tended to swing to the left and its neighbor to the right, the friction between the buffer faces opposed a resistance to any movement, and consequently the cars were materially steadied. The buffers on European rolling stock are usually about 3 ft. 5 in. from the ground, but as recently introduced into this country, the buffers for steadyng the cars are placed nearly in line with the roof. While the lessened motion is highly satisfactory, it may be well to inquire into the manner in which it is brought about, and whether the action of the buffers, like that of equalizers, tends to equalize the loads on the individual wheels and axles.

The lateral oscillations of a long car running at a high speed over a series of reverse curves may undoubtedly be somewhat checked by the friction between the buffers, and if these buffing faces are placed near the roof, where the oscillation is greatest, the power to check oscillation will approximately vary as the height of the buffers from the rails, this distance being regarded as the arm of the lever by which the friction or checking motion acts. The friction acting with this considerable leverage tends to render the train one solid body, and therefore necessarily diminishes the oscillations of individual cars, and forces the train to roll and oscillate as a whole. This limitation of the freedom of motion of the individual cars must throw more or less serious strains on the running gear and permanent way.

This can be clearly seen by a reference to the annexed diagram, in which the positions of two adjacent cars are shown on an exaggerated scale by two typical cross sections. Let the solid lines represent one car running on a tangent, and the dotted lines represent the next car on a curve. It is evident that the superelevation of the rails tends to cause considerable movement of the rubbing buffer faces. The friction, however, between these faces limits the motion and therefore prevents the car shown in the dotted lines from rising and assuming the position shown in the sketch. As, however, the wheels are compelled by the rail to assume the position shown, the distance between the

wheels and the body is diminished, or, in other words, the car cannot follow the movement of the wheels. This, evidently, in this case, means that a greater load is thrown on the wheels of the car on the curve, and, in fact, as its buffer rises, the friction lifts the next car and throws some of the weight of the car in solid lines on to the wheels of the car shown in dotted lines.

It is difficult to determine the amount of weight that is thus transferred from the trucks of one car to that of another. It may possibly be insignificant, but it is just as well that the existence of a possible unequal distribution of weight should be recognized. The vestibule confers such increased comfort and shelter, especially in winter, that the trains fitted with this device have been an unqualified success, and have greatly increased travel, so that it is probable that in a few years few express trains will be run without vestibules. It is, therefore, all the more necessary that some caution should be used in applying the buffer addition to the vestibule proper, and that the buffers used should be so powerful as to cause the possibility of any serious unequal loading of the wheels. If the friction of the buffer is sufficient to materially check oscillation, the weight will probably be unevenly distributed. It should, moreover, be borne in mind that the action of buffers in checking the oscillation of a car is essentially different from that of equalizers. The latter distribute the weight equally, while buffers prevent the efforts of the wheels to relieve themselves of excessive load on a rough or uneven road.

The current year promises to be the busiest one ever experienced by the motive power department of the Pennsylvania system. For the lines west of Pittsburgh 109 new locomotives have been ordered built. Twenty of these have been contracted for with the Baldwin Locomotive Works, while the remaining 89 will be turned out by the shops of the Pennsylvania system. Fifty-five of these engines will be for the Pittsburgh, Fort Wayne & Chicago line (otherwise known as the Northwest lines) and 54 for the Pan Handle or Southwest lines. Of those assigned to the former line 8 will be class O (passenger) engines, 12 Class M (moguls) and 35 class S (consolidation). Those of the Southwest line will be proportioned as follows: Class O, 13; Class M, 18; Class S, 26; special passenger engines, 2.

	Summary.	Class O.	Class M.	Class S.	Special.
N. W. lines.....		8	12	35	
S. W. lines.....		13	13	26	2
Total.....	...	21	25	61	2

Work will be commenced at once and pushed as rapidly as the thorough workmanship which the company requires will allow. It is estimated that the whole lot will be ready for service by next winter. Mr. F. D. Casanave, Superintendent of Motive Power of the Pennsylvania Co. at Fort Wayne, and Edward B. Wall, Superintendent of Motive Power of the P., C. & St. L. and C. St. L. & P. Co. at Columbus, visited Manager McCrea at Pittsburgh this week, and perfected the necessary details connected with the matter.

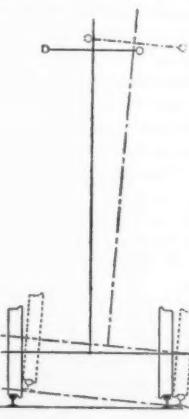
Nor is the motive power alone to be increased. The freight car equipment will be enlarged by 3,020 cars, mostly box-cars. These will chiefly be built at the company's shops, though the press of repair work has compelled the letting of a large number outside.

This addition to the rolling stock, we are informed by an official, is not only warranted by the volume of business but absolutely demanded. "We shall be in fine shape to handle business then, but the development of the country is so phenomenal that I have no doubt we shall be compelled to keep up the work when we get this batch finished."

Other projected improvements by the company in the way of remodeling and rebuilding old depots (a continuation of the work done so extensively last year), are also provided for on a broad scale. Saying nothing of anything else the appropriation for rolling stock must be considerably over one million dollars for the year 1888. What the company proposes doing on similar subjects east of Pittsburgh has not yet been announced.

The proposed lease of the Boston & Providence to the Old Colony is meeting with some opposition, prominent business men appearing before the legislative committee at Boston to argue against it. The arguments thus far have had little effect, the bill having passed the lower house on Wednesday by a vote of 126 to 46.

It is claimed, and with much reason, that the rental is too high. The bonus of \$1,300,000 with the debts aggregating over \$1,000,000, which are to be assumed, bring the total annual charges up to about half a million, which is some 25 or 30 per cent. above the net earnings for the past few years. No further or better reasons for the lease are given than appeared at the time it was first mentioned. The Old Colony and the Providence are competitors for New York travel by Sound steamers, but rates are not likely to be greatly affected by the consolidation. The Old Colony terminal facilities in Boston need extensive improvements, but it is by no means certain that the acquisition of the Providence would remove the necessity for making these improvements. The Providence road's elegant station will not accommodate an unlimited traffic, and there is a good deal of the Old Colony business which could not very well be taken to it. The roads could undoubtedly be more economically managed together and it seems to be generally agreed that the Providence



management has been somewhat wasteful, but the public would seem to be amply warranted in objecting to the agreement to extract 12 per cent dividends from the property every year for the next century. The stock has risen from 300 to 240 on the prospect of the lease, and will probably sell for 275 on the legal ratification of the bargain; and the scheme is stock watering just as much as was Commodore Vanderbilt's forty-million enlargement of the New York Central. The Providence and the Old Colony, either together or separate, are peculiarly situated, in that they are comparatively free from competition and are likely to remain so. A very large share of their business is local; and parallel lines, such as keep rates down in other parts of the country, are not likely to be thought of as regulators here.

A Kansas decision draws attention again to conditions in passengers' tickets limiting the liability of the carrier. The plaintiff bought a ticket from Atchison, Kan., to a place in Dakota, which was headed "special limited ticket," and which among other conditions contained the notice that the railroad would not be responsible for baggage except as to wearing apparel, and then only to an amount not exceeding \$100. There was a blank space at the foot of the ticket for the passenger to sign, but the agent on selling it did not ask her to do so, nor did he call her attention to any of the conditions. Her trunk being injured in transit she recovered a judgment for its value, although the company claimed that under the notice as to baggage it was not liable for more than \$100. But the Supreme Court decides against it. Conceding that by a special contract a carrier may limit its liability, the Court says, yet here there was no contract. Before the passenger could be bound by the conditions in the ticket she must have assented to them; they must have been made known to her, and she must have accepted the ticket with a full knowledge of what it contained. "Where a person purchases a ticket," the Court remarks, "he does not expect that thereby he is making a contract limiting the liability of the railroad company, but simply that he is receiving a check showing that the fare has been paid over the line to the place of destination." Of course, if the agent had put the ticket before the passenger and told her that she must sign the conditions and she had done so, this would be abundant evidence of a contract between the passenger and the railroad upon the terms recited in the ticket.

The semi-annual report of the London Metropolitan (underground) announces that an electric locomotive is to be tried on that line. The absence of smoke and steam would be an important factor in favor of electric locomotives or an underground line, and outweigh the probable greater expense of electric traction. The electric engine is to be of the same power as the existing locomotives, which weigh over 100,000 lbs. The Electric Traction Co., the owners of the patents, have undertaken to construct the engine at their own expense, and "should the experiment prove, to the absolute satisfaction of the directors, an advantageous and economical method of working, the Traction Company are to have the option of entering into an agreement for working the railway by electricity for a term of five years, at a rate per train mile to be agreed, such rate not to be in excess of the cost of working by means of steam locomotives."

The results of this experiment will be awaited with much interest, and should the electric engine prove successful the smoke polluted atmosphere, the great objection to underground railroads, will no longer exist. This cannot fail to have an important bearing on the future of rapid transit roads in New York. The electric motor has not, however, proved a success on the Manhattan, despite a long and exhaustive trial, and it seems doubtful if it can compete with heavy and powerful locomotives of the ordinary pattern, though where little power is required, electricity, under favorable conditions, appears to present some advantages over steam motors.

The last number of the *Manufacturers' Record* contains a list of all the cotton mills in the South, including Maryland, but excluding Missouri, with the number of spindles and looms, which it compares with the returns for 1880, as follows:

	January, 1888.	May, 1880.
No. of mills ..	294	179
No. of spindles ..	1,495,145	713,989
No. of looms ..	34,006	15,222

Georgia has the largest number of spindles, 390,440, an increase of 94 per cent. since 1880. North and South Carolina follow with 250,854 and 248,136, showing gains of 144 and 167 per cent. respectively. Florida with 816 spindles is stationary, and Texas, which produces about 1,500,000 bales of cotton, has 5,494 spindles, having about doubled its number.

The reports show that the aggregate value of cotton mill products in the South for last year was about \$34,000,000, and the *Record* estimates that if all the cotton raised in this country was manufactured there it would represent a value of \$1,000,000,000 instead of \$300,000,000 as at present.

The increase in both spindles and looms in the South, it will be noticed, is over 100 per cent., while in the whole country the increase has been at the rate of about 20 per cent. during the same time. The total number of spindles in the country is over 13½ millions, with nearly 400,000 looms, or in other words the South has about 10 per cent. of the manufacturing capacity of the country. But every southern state except West Virginia has cotton mills, while there are 7 northern states without such mills.

The South seems generally prosperous this year. There is a gain of \$75,000,000 in the value of its agricultural pro-

ducts, over half of which is in corn, and more than \$100,000,000 were expended on new and old railroads.

Heretofore the roads built in that section of the country were almost exclusively in the service of agriculture, but the new roads are greatly built in the service of mines and manufactures. The difference in the amount and kind of service they will perform is indicated by a statement in the *Aniston Hot Blast* that the two new furnaces building in that town will consume 1,650 tons of coke, ore and limestone daily, giving with the pig iron produced a yearly freight of 670,000 tons, which it asserts is equal to 2,800,000 bales of cotton, or 40 per cent. of our entire cotton crop.

A hearing was had last week by the Senate Committee on Inter-state Commerce of arguments by the express companies against the proposed amendments to the Inter-state Commerce Act to bring express companies within its provisions. Mr. Clarence A. Seward, for the Adams Express Co., pointed out one practical difficulty in the proposed amendment to Section 6. The amendment would compel express companies to print and keep open for public inspection in each office at which freight is received a schedule of rates; and be offered a printer's estimate which gave the ridiculous figure of \$30,960,000 as the sum required to supply each of the 12,000 offices at which the Adams Express Co. and its connections receive freight with the requisite amount of printed matter. It is added that these figures seemed to stagger the members of the committee.

Mr. Isham, the attorney for Pullman's Palace Car Co., has also been before the Senate Inter-state Committee in opposition to the proposed amendments to the Inter-state Commerce act which, it will be remembered, also provide for the bringing of sleeping car companies within the operations of the act. The main argument is substantially the same as that of the express companies. Mr. Isham, however, brought forward evidence that the United States Supreme Court had decided that the Pullman Palace Car Co. is not a common carrier; that its relation to the railroad companies is simply that of a renter of cars, and that it is in no wise responsible for the carriage or transportation of the cars.

A petition has been presented in the Senate by Senator McPherson asking for a change in the plan of the Arthur Kill bridge. The petition is signed with over 200 names, and represents that the structure as designed would practically destroy the commerce of the Kill. Mr. Robert H. Sayre and Senator Chase, on behalf of the Lehigh Valley and the Pennsylvania, have also presented to the Secretary of War a statement setting forth the injury which the bridge would cause to the business of their companies in the Kill. It is said that Mr. Sayre makes affidavit to his intention to recommend the removal of the Lehigh Valley terminus from Perth Amboy to some point north of the bridge in case it is built on the present plan. Suit has also been brought by the state of New Jersey to restrain the contractor. Meanwhile the work goes forward actively, and it is impossible to foretell the result of the struggle.

The Congressional committee to investigate the Reading strikes and other labor troubles in Pennsylvania is announced. It consists of Messrs. Tillman, of South Carolina, Stom, of Missouri; Chipman, of Michigan, Anderson, of Kansas, and Parker, of New York. The first formal meeting was held yesterday. It will be remembered that the majority of the House committee recommended that this investigation be referred to the Inter-state Commerce Commission, but "politics" perhaps demanded the present arrangement, in which there is naturally an opportunity for some one to make capital. It is to be hoped that at the worst this action of Congress will not protract the present deplorable state of things.

The change of the name of the station on the Cincinnati, New Orleans & Texas Pacific, which we recently announced on the authority of a newspaper item, appears to have been given erroneously, a circular issued by the road last Saturday giving the new name of Summit (the name whose misreading occasioned the collision) as *Harrison*. Other changes are as follows: Windom, changed to Providence; Harrington Junction to Verchamp; State Line to Isham; Darwin to Evansville; Camp to Lumberton, and Bolers, on the Vicksburg & Meridian, changed to Clarksburgh.

While an observer at a distance is perhaps not warranted in judging of the merits of changes of this kind, it certainly seems from surface indications that these selections are happier ones than those on an eastern road which we announced a few weeks ago.

New South Wales is next to Victoria the most populous of the Australian colonies, having, at the end of 1846, 1,030,762 inhabitants to 1,303,052 in Victoria, but it has a much greater area, 308,560 square miles against 88,451 square miles in Victoria, and to develop this area it had built up to 1885, 1,656 miles of railroad and had 445 miles under construction. This has not been constructed from the resources of the country but from loans negotiated in London, until now the indebtedness of the colony amounts to £35,564,000, with an annual interest charge of £1,454,000. At the commencement of last year the colony found itself confronted by a deficit of over £2,000,000, but, as its credit was high, this was ascribed to bad book-keeping or undue optimism on the part of the finance minister. This year the deficiency amounts to £2,600,000. Nominally this large debt of \$168 per head has been increased to enable the colony to build and own its public improvements, but as the interest charges are only a little over 4 per cent. (4.09), and as the railroads pay 3.05 per cent., the deficit cannot be charged entirely to the railroads. As a matter

of course while such large expenditures were being made for borrowed capital, the debt has more than doubled since 1882. There was great apparent prosperity in the colony, in other words a boom, but when the expenditures of a country for a year amount to £3,513,000, of which £2,600,000 is deficit, there must apparently be a serious retrenchment; though there can be but small doubt that the colony will pull through eventually, as it has an immense area of public land, and with North Australia has about all the accessible coal on the island, its output of coal being for 1886, 3,000,000 tons, valued at over \$7,000,000. The holders of the New South Wales bonds have, in addition to the railroads, all the other resources of the colony as security, and investors will possibly watch with interest the value of the extended security as well as the attitude of our kinsmen at the antipodes under the claims of foreign bondholders.

Messrs. Charles Scribner's Sons announce they have been at work for some months preparing for *Scribner's Magazine* a series of articles which shall cover in a popular and readable way the building and the managing of railroads, to be divided roughly as follows: Construction, engineer work, rolling stock and motive power, passenger traffic, accidents, administration and the railroad man's life. Each subject is being treated by a writer well known in his own department. The articles will be illustrated, and it is proposed to begin the publication early in the summer. They ask that any interesting and original material may be brought to the attention of the manager of their art department.

TECHNICAL.

To Tunnel the East River.

It is announced that a company was incorporated last August to tunnel the East River. The names of the incorporators are given as follows: Walter S. Gurnee, Augustus C. Gurnee, Thomas Rutter, F. K. Hain, Oliver W. Barnes, Gen. H. S. Haidekker, Malcolm W. Niven, Everett P. Wheeler, Henry S. White, Col. Robert Townsend and E. Pratt Stratton. The President of the company is Gen. Roy Stone; Secretary, M. W. Nevin, and Treasurer, G. R. Sheldon. The company applies to the Board of Aldermen for a franchise. It is proposed to drive two tunnels 50 ft. apart, under the East River at or near Thirty-fifth street. These tunnels are to open between Ninth and Tenth avenues in New York, connecting there with the freight lines of the New York Central Railroad. At Fourth avenue one tunnel is to connect with a north and south tunnel opening at Fifty-fourth, to connect with the New York Central. At Ninth avenue and Thirtieth street a branch tunnel is to be taken off to connect with the Hudson River tunnel at Christopher. Passenger elevators are to be constructed in shafts, at points convenient for connection with the elevated roads, with which they will connect by bridges at the platform level. The aggregate length of the tunnels is estimated at about 7½ miles, to cost in the neighborhood of \$1,000,000 per mile.

Asbestos Lagging.

Several correspondents have asked where the asbestos mortar recently used in lagging locomotives by the Rhode Island Locomotive Works may be obtained. In that case it was got from the H. W. Johns Manufacturing Co., of New York, who make a great variety of asbestos fabrics and preparations. They have adapted this material to building felt, retort and furnace cements, stove lining, pipe and boiler coverings, steam packing, fire-proof curtains and screens and various other purposes.

The Philadelphia & Reading has contracted with the Baldwin Locomotive Works for 60 locomotives, to be delivered during the coming spring and summer.

New York Grain and Feed Depot.

The New York Central have within the last few years made several improvements in the freight depots on the site of the old burned Manhattan Market building, 34th street and 11th avenue. Six rows of two story brick storehouses have been built on 33d, 34th and 35th streets, between 11th and 12th avenues. Three of these rows are devoted mostly to dealers in hay, straw, grain and feed. Another is taken by wholesale dealers in potatoes, apples and onions. Another is occupied by the receivers of Chicago dressed beef. Cabbages, turnips and various kinds of produce also come here, forming a vast storehouse or wholesale market. The stores are built by the railroad company to suit the needs of the various dealers and receivers, and are rented by the latter. Electric lights have recently been put in the yards.

The most prominent building erected is just being finished at 11th avenue and 34th street. It is designed for grain elevator, feed mill and storehouse, and is of brick, four stories high, with a peaked roof built to accommodate its special uses. The engine is of 250 horse-power. Two car loads of grain can be dealt with simultaneously. The three mills are on the second floor and are provided with steel rollers for crushing the grain. There is also a bolting arrangement. Manual labor is reduced to a minimum and the cost of handling the grain also made comparatively small. The elevator can hoist about 4,000 bushels an hour. It does not compare in capacity with the elevators on the river-front used in loading vessels, but for a feed storehouse, mill and elevator combined, taking grain out of cars and landing it, ground or underground, in trucks, it is probably the most extensive and perfect ever built. The building also contains handsome offices and it will be immediately leased by a well-known firm.

Locomotive Test.

It is reported that the Chicago, Burlington & Quincy is about to test the capacity of ten-wheel engines of different makes for hauling heavy passenger trains at a high speed. The trials will be made with a west bound train of eighteen cars, seven of them sleepers, between Chicago and Galesburg. The object of the test is to determine what make of engine is most suitable for fast and heavy work. The Chicago, Burlington & Quincy has an engine which will take part in the trial, and it is understood that the Chicago & Alton; Chicago, Milwaukee & St. Paul; Pittsburgh, Fort Wayne & Chicago, and Chicago Burlington & Northern will all send engines to enter the contest. The Chicago, Burlington & Northern will send one of the new ten-wheel engines recently purchased by this company. The result of this trial is being looked forward to with much interest by railroad men.

The Merced Irrigation Canal.

This canal was formally opened at Merced, Cal., Feb. 1. This is the largest irrigation work in the country and has been building for five years, and is said to have cost, up to the present time, \$1,500,000. About 485 square miles will be irrigated with the water from this canal. The water prism is 100 ft. wide at the top, 70 at the bottom, and 10 ft. deep, with a fall of 1 ft. to the mile. There are 2 tunnels, 4,400

and 3,000 ft. long, respectively, including the approaches. That part of the canal now completed is 27 miles long. The valley near Merced has been converted into a reservoir by the construction of an earth dam 4,000 ft. long, 275 ft. wide at the base and 20 at the top, and 54 ft. high. This reservoir will cover 640 acres, with an average depth of 30 ft.

New Tug for the New York, New Haven & Hartford.

The Harlan & Hollingsworth Company launched, Feb. 7, a powerful tug for the New York, New Haven & Hartford, to be used in New York harbor. This is the second of the kind built at Wilmington for that company. Its compound engines have cylinders 18 and 34 inches in diameter with a 26-inch stroke.

Distribution of Motive Power by Compressed Air.

A system of distributing compressed air for motive power purposes has been lately inaugurated at Paris. The works for compressing the air are of considerable magnitude, and cover an area of 18,000 square yards, of which 2,400 square yards is roofed over. There are already fixed and in operation seven steam engines of 400 h. p. and two of 100 h. p. each, a total of 3,000 h. p. The conduits have already been laid over the whole area comprised between the line of the Boulevards and the Rue de Rivoli. These are sometimes laid in trenches cut for the purpose, and sometimes in the sewers. The total length of pipes laid was, at the end of last December, a little over 30 miles. This source of power is used for working electric light machinery in a large number of establishments, among which may be mentioned the Café Americain, the Café de Paris, the Café Anglais, the offices of the *Figaro*, and the Jardin d'Hiver.

Nicaragua Canal.

Judge Charles P. Daly, Hiram Hitchcock and others, recently appeared before the House Committee on Commerce in advocacy of Representative Norwood's bill to incorporate the Maritime Canal Co., of Nicaragua. Judge Daly made the principal argument, mainly on the constitutional question involved and in demonstration of the financial ability of the company to carry out the work. He said that the company had positive assurances from bankers in New York, Boston and Berlin that the \$100,000,000 would be speedily taken if the United States grants the charter.

The Pittsburgh Cast-Steel Gun.

The American Manufacturer has an interesting description of the casting of this gun, with plates. The gun is cast solid from Bessemer converter steel. The charge was blown 29 minutes when the converter was turned down, and the melted metal rabbled for about 12 minutes. The gun was cast vertical, muzzle down, through an external runner 2½ in. in diameter, which fed the metal in at the bottom. The total length of the casting was 23 ft., of which 6 ft. was sinking head. The finished length of the gun is to be 193.53 in.

A noticeable feature of the casting is the very small amount of metal to be removed by turning, except at the trunnions. In the old style of Rodman guns, which were cast hollow, with the breech down, very little reduction was made in the size of the casting toward the muzzle. The gun, though cast on the 11th of January, and left five days in the mold to cool, is already turned, and the rough boring has commenced. The casting was apparently successful, as no flaws have as yet been discovered.

Test pieces taken from near the trunnions showed ultimate strength, 92,700 lbs.; elastic limit, 51,960 lbs., with an elongation of 12½ per cent. in 2 in. In addition to the tensile test, a piece of the runner, 4½ in. long, was turned down to 2 9-16 in. in diameter, and bored with a 15-18 in. drill, so that the bore hole and the metal left bore the same ratio to each other as in the thickest part of the gun; conical round wedges were then driven into the bore with a 10,000 foot-pound blow, without rupturing the test piece.

As soon as the rough boring is finished, the gun will be shipped to Washington, where it will be finished, after which it will be tested by firing ten 100-lb. projectiles with a muzzle velocity of at least 2,000 ft. per second, as rapidly as the gun can be loaded and fired by hand. The Manufacturer calls attention to the severity of this test, which it thinks would not be acceded to by any manufacturer of "built up" guns, and its suggestion that the cast and a built up gun should be tested side by side, under as nearly identical circumstances as possible, seems a good one.

The Wittman patent was used in making the steel for this gun. This patent was transferred to the Mullins Silicated Iron & Steel Co. last December.

The "Abt System" in India.

The report on Indian Railways for 1886 and 1887 mentions the intention of the government to change the short piece of meter gauge on the Bolan Pass road to the standard gauge of India, 5 ft. 6 in., after rectifying the alignment, and place seven miles of the Abt rack on the worst grade; two of the Abt engines having been ordered from Messrs. Rinecker, Abt & Co., at a cost of £3,500 each. These engines will haul by traction on ordinary grades, working their pinion wheels in the Abt racks on steeper grades. If this proposed experimental piece proves successful, it is intended to place the racks on all grades of 110 ft. or more per mile, by which it is expected a saving of 68 lakhs of rupees, \$2,312,000, will be made on the construction of the Ghaut portion of the Bolan Pass line as far as Abigum.

The Cascade Tunnel.

About the middle of January this tunnel was in 3,890 ft. at the west end and 4,100 ft. at the east end, leaving 1,860 ft. yet to drive. The average progress is 15 ft. a day. It is expected that track will be laid through in May.

A New Hectograph.

A new hectograph, of German invention, consists of a sheet of blotting paper which has been soaked and covered with a dilute solution of gum, water, ammonia, sugar, and glycerine, the quantities being as follows: Gum, 4; pure water, 5; ammonia, 3; sugar, 2; glycerine, 8. The gum is first dissolved in the water and ammonia, which is warmed, the sugar and glycerine are then added and the temperature raised to boiling point. The warm mixture is spread over the sheet of blotting paper by means of a brush. The paper thus treated is ready for use in three days. When used it is dampened by a sponge and left one or two minutes. The drawing or writing to be copied is placed over the copying paper, face downward, and pressed with a roller or with the hands. After one minute it is taken away and a sheet of paper on which the reproduction of the drawing, etc., is wanted is placed over the copying paper and slightly pressed. An exact copy of the original is thus obtained. Several copies can be obtained by this method from one original. If the copying paper becomes dry after a few copies have been taken, it is again dampened. The same copying paper can be used after 24 hours for the reproduction of other and different drawings, etc. Aniline ink should be used in the original.

Blow-Holes in Steel.

The presence of blow-holes in steel was, at one time, generally attributed to bubbles of carbonic oxide. More recently, the investigations of Müller, Stead and others have proved the

cavities in steel ingots to contain nitrogen and hydrogen. Mr. W. F. Durfee has recently communicated to the United States Naval Institute an ingenious and somewhat novel view of the subject. He considers the blow-holes in ingots to be caused by air carried down into the mold by the stream of steel rushing out of the ladle. The action may be illustrated by holding a glass of water under a running tap, when the course of the bubbles may easily be seen. When the tap is turned off, the fluidity of the water instantly allows the bubbles to escape; but if the experiment be repeated with a more viscous liquid—melted gelatine, for instance—some of the air will be unable to escape. When the mass has solidified, the disposition of the bubbles will be found to be very similar to that of the cavities in a soft steel ingot. The temperature of molten steel is sufficient to expand air about seven times; while any atmospheric moisture would be converted into gases with corresponding increase of volume. So that a small quantity of air may produce a considerable degree of porosity. Mr. Durfee proposes to overcome the difficulty of producing sound ingots by making the steel sufficiently fluid to permit the escape of the air bubbles by the addition of a small quantity of aluminum. The improvement in fluidity, and subsequent solidity, resulting from the addition of less than 0.1 per cent. of aluminum to melted wrought iron or mild steel has long been known, and is practically taken advantage of in the manufacture of Mitis castings; but however beneficial, its application to ingot steel must in the meantime be limited to cases where cost is an entirely secondary consideration.

A Gigantic Hydraulic Forging Press.

A gigantic hydraulic forging press has been lately added to the plant of the Atlas Steel Works at Sheffield. This press, believed to be the most powerful and efficient at present in existence, nominally exerts a total force of 4,000 tons, but its actual full power is considerably greater. Three large furnaces, each capable of heating an ingot of 100 tons, prepare the work for the massive machine, and two traveling cranes, each capable of lifting 150 tons with ease, convey the forgings from the furnace to the press, and manipulate them as required. One man, who stands at the floor level in a cage suspended from the crane and traveling with it, has under his hand four valves, by which he lifts, lowers, advances, retires, moves sideways, or revolves, the forging on its own axis. A second man works the lever which governs the strokes of the press, and by observing an index in front of him regulates with the utmost nicety the distance from the anvil at which the top tool is to cease its advance. A forgemaster and several furnacemen are also required to superintend and to feed the apparatus, but its working is entirely under the control of the two men referred to. Mr. Krupp has ordered one precisely like it for his own works from Messrs. Tannett, Walker & Co., the makers of the press. At Essen the forgings are all done by hammers, which are still used in Sheffield for several kinds of forgings.

THE SCRAP HEAP.

Carload Rates.

The American Grocer, in an editorial on the hearing before the Inter-state Commerce Commission, says:

"The railroad side of the question was ably presented. It was claimed that discrimination was necessary to give the Western connections of the trunk lines an adequate rate for distributing, but it was drawn out in cross-examination that there was nothing in the Inter-state Commerce law to prevent the local roads from charging their own local rate as heretofore, which many of them do, and nothing to prevent the trunk lines from raising the carload rate, so that the discrimination between small and large shippers would not be so great. There was an evident attempt made to obscure the controversy by an enormous mass of figures and statistics, compiled for the purpose of showing that the rate on small quantities was unremunerative, and the railroads brought forward their ablest and most plausible experts to prove this. * * * The policy of the railroad men was evidently to make it appear a controversy between Eastern and Western jobbers for trade, but this bubble was pricked by the testimony of Messrs. O'Donnell and Stevenson, of the Pennsylvania Retail Grocers' Association, who stated that, while they had nothing against their local jobbers, they did not wish to be at their mercy, and that it was to the interest of the retailer to have competition for his trade, that in order to obtain the requisite quality and variety of goods, they were obliged to patronize all markets, and that they could see no justice in the retail grocer being discriminated against on his freight, when the retail drygoods man or boot and shoe dealer could ship any quantity as cheaply as the large dealer who shipped carloads of these commodities. * * * Most retailers are American citizens, and American citizens, while they may of their own free will buy in the smaller markets, will not favor being compelled to do so. Most of them know that better variety and quality are to be obtained in the primary markets. The Inter-state Commerce Commissioners know that the sources of information in regard to transportation matters are largely in the hands of the railroads themselves: that in consequence shippers are at a great disadvantage to enforce their rights: that in a complex question it is easy to prove almost anything by properly manipulating figures and statistics; that it is no defense to prove that a part of any business is unremunerative, provided the whole is remunerative. Every merchant does some part of his business at a loss, his gross profits do not amount to as much on portions of his business as the expense of doing it, but the remunerative part cannot be had without the unremunerative, and it is the average which must be considered. This is especially true of a semi-public institution, like a railroad."

Bad Make-up of Trains.

A correspondent of the Railway Service Gazette, referring to the careless placing of cars of long lumber, unhandy oil tanks, empty high side-board coal cars, etc., in the rear of a train, where brakeman will be impeded in getting at the brakes, says: It is a notorious fact that in many instances it would be almost impossible to stop some freight trains as they are made up. It should be the duty of every yardmaster to put at least four good brakes next to the caboose, and as many more next to the engine. I see trains almost daily which it would take a good active man from ten to fifteen minutes to get over and not set a brake. Trains made up hit and miss are, besides being dangerous to life and property, more expensive to handle, as all hands are afraid of them. The engineer shuts off a little sooner. The brakemen hold the train as hard as they can, and the consequence is a drag into a station. Or, in case of making an unexpected stop, such as have to be made frequently, the first signal the engineer gets he reverses, uses sand, and stops as soon as possible. This sort of work is expensive either way: it is hard on the machinery, hard on the coal pile and mighty trying to the nervous system of the crew.

The Revolving Anti-Snow Storm.

The Nor-Nor-Western Daily Blizzard and General Scrocher remarks that the rotary snow shovel is the salvation of the blockaded Northwest. It bites like a serpent and

bloweth like a blizzard. It brings delayed mails, refills coal bins, restores communication and digs out beleaguered towns. It is worth a brigade of shovels. It goes through a drift like a buzz saw through a knot. It is a tremendous steam auger in a box on wheels. It vomits the snow through a discharge pipe with enough violence to knock over a chimney. It eats up a heavy drift at the rate of sixteen miles an hour. It is the mechanical expression of Northwestern energy. It will sweep Dakota into the Union. Even Springer can't stop it.

Per Diem Car Service.

The Southern Pacific Company has adopted the combined per diem and mileage basis of settlement for the use of cars, with the provision that the charge for switched cars shall be paid by the road on which the shifting is done. The per diem on cars owned by individuals, firms or private companies is unprovided for, but in the absence of special arrangements no payment will be made for their use.

Accident Insurance.

A novel scheme of accident insurance is proposed by a western newspaper. At the head of its editorial page is this standing notice: "One hundred dollars will be given by the Gallinipper Company to the person who it shall decide is next of kin to any one who is killed in a railroad accident on a regular passenger train in the United States or Canada; provided the deceased shall have on his person at the time of the accident a copy of the Gallinipper of that day or of the previous day."

The Railroads of South Australia.

The report of the Board of Public Works of South Australia for 1886 and 1887 shows that 1419 miles were constructed in that colony at the end of last June, at a cost of £9,083,093, or \$31,238 per mile, and 353 miles were under construction. The gross receipts were £595,192, and expenditure £382,306, or 64.23 per cent., the net earnings amounting to 2.52 per cent. on the capital, against 2.37 per cent. the previous year. As the money for constructing the lines was borrowed at 4 per cent., the loss to the colony for this railroad system is about £150,000. Against this must be set off the increased value of the public lands and the convenience of the roads. It is hoped that greater skill in management will allow the roads to pay 3 per cent. in future. The rates are per mile, passengers 1.06d., freight 2.2d.

South Australia had an estimated population, at the end of 1886, of 312,439, out of about 3,500,000 in Australia, including New Zealand, which had nearly 600,000. The colony is debating a "trans-continental" road to the north side of the island, which a syndicate offers to build for a land grant.

A Money-Making Locomotive.

Mr. F. W. Webb's little model of the compound locomotive Dreadnought, which has been the round of all the recent exhibitions, appeared last year at Manchester, and was more than usually successful in gathering in the pennies which act as the motive power to set it in action. The total amount received by it was £127 7s. 3d., which has been distributed in various sums among twelve medical charities, the poor of Crewe, and the attendants in charge of the engine. Mr. Webb finds that the engine wheels made 183,396 revolutions during the time the exhibition was open, equal to traveling a distance of 83 miles, and consequently it earned £1 10s. 8d. (\$7.46½) a mile. We would recommend this fact to the notice of those of our correspondents who are debating the question of English and American locomotives. Mr. Webb's engine certainly cost less than the cheapest of those running in America, while its earnings and working expenses are without parallel.—Engineering.

Railroad Concession in Santo Domingo.

The government of Santo Domingo has granted a concession to American capitalists for the construction of a railroad from the city of Santo Domingo into the interior of the island via San Cristobal, and besides the grant of valuable lands has pledged the issue of a large amount of 8 per cent. government bonds secured by public revenues as a subsidy.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Alabama a contract made between two railroads provided that "the party of the first part shall have the perpetual and free use of the right of way of the party of the second part, in a manner to be hereafter determined by the court." No such deed has ever been executed or requested, but the party of the first part was placed in possession of the right of way, and continued in its daily use undisputed for over nine consecutive years. The Supreme Court holds that the conduct of the parties and the uniform usage thus acquiesced in is deemed a waiver of this feature of the contract. The Court likewise rules that "free" in the contract means free from compensation, and not merely uninterrupted use. The Court also construes the state statute permitting railroads to construct their track across those of other roads, holding that the right of two railroad companies to make a crossing, and to appropriate to such purpose a reasonably convenient portion of each other's right of way, is paramount to a mortgage executed by one of the companies to secure its bonds, or the lien held by the state under a statute, authorizing the endorsement by the governor in the name of the state of the first mortgage bonds of railroad companies. And finally that the statute does not restrict the right of crossing to a perpendicular crossing.

An Oregon statute provides that all sales of corporate stock transfer to the purchaser all the original holder's rights, and subject him to any unpaid balance due on the stock. A debtor to a railroad company conveyed all his stock to one trustee, to sell the same to any one who would pay his indebtedness to the corporation, and get him a discharge therefrom. The Supreme Court holds that this was no sale.²

In Illinois a railroad asked an injunction restraining the collection of a county tax on the ground that its property was assessed at its full value, while all other property in the county was assessed at one-third its value. The Supreme Court holds that it is not a ground for enforcing the tax, the assessments being in conformity with the statute, that the officers have failed to perform their duty in respect to other property and refuse the injunction.³

Carriage of Goods and Injuries to Property.

In Mississippi, the Supreme Court holds that where a contract for transportation of goods is made between a railroad company for itself, the warehouseman who is to receive the goods and deliver them to the connecting carrier, and the connecting carrier, on the one part, and the shipper, who has no knowledge of the tripartite agreement, on the other, the railroad company is not the agent of the shipper, and has no power to make a contract with the warehouseman that would relieve him from responsibility for its own negligence, resulting in loss of the goods by fire, or to bind the shipper by any contributory negligence of which the railroad company might be guilty in delivering the goods in an unsafe position in the warehouseman's yard.⁴

In Florida, in an action for killing a mule, it appeared that

the railroad track was straight for a long distance, and the mule was first seen on one side of it when the train was 200 yards off, his head turned from the track. The alarm whistle was then blown and brakes put on, but when the train, running 10 or 12 miles an hour, got within 200 feet of the mule, he turned to cross the road, whereupon the engine was reversed, but did not check the train sufficiently to prevent striking the mule as he was going down on the other side. The Supreme Court rules that the railroad is not liable; though it might have been had the animal been on the track where it was first seen.¹⁵

In Florida a railroad is fined in a criminal proceeding for a nuisance in obstructing the highway with standing cars and the track is ordered to be removed.¹⁶ In another prosecution of the same kind, in the same state, the Court holds that to be indictable the obstructing must be "wilful," and that it is not enough that it was unnecessary.¹⁷

In Georgia the Supreme Court grants an injunction restraining a railroad from using a public street as a switching yard, and from loading and unloading freight there.¹⁸

In Illinois the Supreme Court lays down with much particularity the rules to be observed in assessing damages for the taking of land for a right of way. They are as follows: The fair market value of the land proposed to be taken, having proper regard to the location and advantages as to situation and the purposes for which it was designed and used, should be considered. And where but a part is taken, and the part taken is of greater value in connection with the whole than as a separate parcel, the measure of damages will be the fair cash value of the part taken as a part of the whole. If the lands not taken would be depreciated in value by the construction and operation of the proposed road, the measure of damages would be the difference in their market value before the construction of the road and after its construction. The inconveniences actually brought about by the construction of the road or incidentally produced by dividing her land, as to water, pastures and improvements, should be estimated, although such injury and damage might not be susceptible of definite ascertainment; and for such incidental injury as would result from the perpetual use of the track for moving trains, or from danger of killing stock, or injury to pasturing stock, or escape of fire, and, generally, for such damages as are reasonably probable to ensue from the construction and operation of the proposed road, compensation should be given. The fact that the land is already crossed by one road the Court declines to say may not be considered by the jury in determining the damages by reason of the construction of the new line of road. The physical condition of the land, whether affected by another railroad, watercourse, or other natural or artificial objects, must be considered, not in respect of the damages, or depreciation caused by such other railroad or watercourse, but for the purpose of determining the damages occasioned to the owner by the proposed improvement.¹⁹

Injuries to Passengers, Employees and Strangers.

In Illinois the plaintiff entered a regular passenger train at Chicago to be carried to his home. When the train reached certain ore docks belonging to the Joliet Steel Co., it was stopped in the midst of a mob of striking workmen, theretofore employed by the steel company, who had "gone out on a strike," and took on board quite a number of non-union men, or "scabs," as they were termed by the strikers, and at the next railroad crossing, the train was captured by a portion of the strikers, who had congregated there for the purpose, and broke into the car wherein the plaintiff was riding, and commenced beating the non-union men, and firing pistols in and around the car. The plaintiff received a bullet in the groin. The Supreme Court affirms a verdict of \$12,500 against the railroad, holding that the carrier must while he is in its charge protect the passenger from injury of all kinds within its control.²⁰

In the same state, a man in charge of stock, the cars being detached to make a running switch, stood upon the foot board of the locomotive, at the direction of the engineer. He was thrown off and killed. The Supreme Court affirms a verdict against the railroad. As the jury had found that the man was not negligent, the Court refused to rule that riding on the engine was negligence *per se*.²¹

In Kansas the Supreme Court rules that where a person operating a machine complains to the superintendent of machinery that it is defective and unsafe, and such superintendent repairs it and tells the operative he has done so, it is not negligence for such operative to continue at work at the machine, although it afterwards appears that the repairs were not substantial.²²

In Illinois a verdict in favor of a conductor of a freight train, the jury having found that the absence of a handle and step at the end of a car over which the conductor had to pass and which caused the injury was negligence in the road.²³

In Indiana, an employé was at work on a flat car on a side track. A line of telegraph poles of the usual height, which supported wires crossing the track to the depot, stood along the company's right of way, where they had been maintained substantially in the same position since 1874, one of the wires being used by the railway company, the other in the business of the telegraph company. A freight train approached the station over the main track, and on the top of one of the cars somewhat above the ordinary height stood a brakeman, 6 ft. 3 and a half in. in height, whose head came in contact with one of the wires which crossed the track. The blow broke the insulator of the telegraph pole, causing the wire to become detached and fall down on the top of a moving car, catching a brake-handle which carried it forward with the moving train, the wire coiling about the body of the decedent as he stood on the flat car, dragging him from the car, inflicting injuries resulting in instant death. The Supreme Court reverses a verdict against the railroad, holding that the facts showed no negligence on its part.²⁴

In Indiana the Supreme Court rules that a person walking on a railroad track is a trespasser, and that the railroad is not liable for his being killed while there unless the engineer or servant running the train was guilty of wilful negligence. But there may be a wilful act, in a legal sense, without a formed and direct intention to kill or wound any particular person. There may be a constructive or implied intent without an express one. An engineer of a moving train has a right to presume, until the last moment, that a person walking on the track will leave it in time to avert danger. If two men are seen on a track in front of a train, and one of them risks his safety in his effort to signal the foremost man to leave the track, the engineer who sees the signal is guilty of a wilful wrong if he does not use ordinary care to stop the train. But if it is not proved that the engineer saw the signal, it will not be presumed that he did, and the railroad can not be made to pay damages.²⁵

Another case in the same state is very similar. A woman was injured while walking with two companions along the track at a place where the public had no right to use the company's right of way, and without any invitation or license to do so. She and her companions chose the right of way rather than the street, because of the muddy condition of the street and the better facilities for foot travel afforded by the railroad track. They were upon the track at a place where trains were constantly passing and where it was highly dangerous to be. The engineer of the train which struck her

had a right to assume, if he saw her, that she would leave the track. The Supreme Court holds that the railroad is not responsible.²⁶

In Virginia a railroad track ran on a city street, and from it a side track led to a wharf, through a gate which was surrounded by high fences, and on the east side by lofty buildings that effectually prevented persons coming from the wharf from seeing approaching trains. The railroad kept no watchman at the gate. At the time of the accident it was pushing a train to the wharf without giving any signals, and plaintiff was driving out when some one called to him, and he looked back. Just then the train struck the plaintiff's wagon, throwing him out and severely injuring him. A verdict for \$2,000 damages is affirmed by the Supreme Court of Appeals.²⁷

- ¹ *Aia. Great Southern R. R. Co. v. S. & N. A. R. Co.* 3 South Rep., 286.
- ² *Powell v. Willamette R. Co.* 15 Pac. Rep., 663.
- ³ *11 & St. L. R. R. & C. Co. v. Stockey*, 11 Cent. Rep., 614.
- ⁴ *Merchants' Wharf Boat Assn. v. Wood*, 3 South. Rep., 248.
- ⁵ *Savannah F. & W. R. Co. v. Rice*, 3 South. Rep., 170.
- ⁶ *Palatka & Indiana Riv. R. R. Co. v. State*, 3 South. Rep., 158.
- ⁷ *Savannah F. & W. R. Co. v. State*, 3 South. Rep., 204.
- ⁸ *Kavanaugh, Mobile & Girard R. R. Co.* 4 S. E. Rep., 113.
- ⁹ *C. B. & Q. R. Co. v. Bowman*, 11 West. Rep., 508.
- ¹⁰ *C. & A. R. Co. v. Pillsbury*, 11 West. Rep., 757.
- ¹¹ *L. S. & M. S. R. Co. v. Brown*, 11 West. Rep., 800.
- ¹² *Atchison, T. & S. F. R. Co. v. McKee*, 15 Pac. Rep., 484.
- ¹³ *C. B. & Q. R. Co. v. Waror*, 11 West. Rep., 641.
- ¹⁴ *Wabash, St. L. & P. R. Co. v. Locke*, 11 West. Rep., 877.
- ¹⁵ *Palmer v. C. St. L. & P. R. R. Co.* 11 West. Rep., 677.
- ¹⁶ *Gregory v. C. C. C. & I. Ry. Co.* 11 West. Rep., 825.
- ¹⁷ *Norfolk & W. R. Co. v. Burge*, 4 S. E. Rep., 21.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago, Caldwell & Southern, special meeting, Tokeka, Feb. 16.

Delaware, Lackawanna & Western, annual meeting, New York, Feb. 21.

Illinois Central, annual meeting, Chicago, Ill., March 14.

Kansas, Nebraska & Dakota, annual meeting, Fort Scott, Kan., Feb. 14.

Louisville & Nashville, special meeting, Louisville, Ky., Feb. 21.

Missouri Pacific, annual meeting, St. Louis, Mo., March 13.

New Orleans & Northwestern, annual meeting, New Orleans, March 5.

New York & Boston Rapid Transit, annual meeting, New York City, Feb. 23.

New York, Susquehanna & Western, annual meeting, Jersey City, N. J., Feb. 23.

Norfolk Southern, annual meeting, Elizabeth City, N. C., March 1.

Peoria, Decatur & Evansville, annual meeting, Peoria, Ill., March 6.

Philadelphia & Erie, annual meeting, Philadelphia, Pa., Feb. 13.

St. Louis, Iron Mountain & Southern, annual meeting, St. Louis, Mo., March 13.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, 2 per cent. on common and preferred stock, payable March 1.

Chicago & West Michigan, 1 per cent., payable Feb. 15.

Cleveland & Pittsburgh, quarterly, 1½ per cent., payable March 1.

Detroit, Lansing & Northern, semi-annual, 3½ per cent. on preferred stock, payable Feb. 15.

Kansas City, Fort Scott & Gulf, semi-annual, 4 per cent. on preferred stock, 2½ per cent. on common stock, payable Feb. 15.

Kansas City, Springfield & Memphis, 2½ per cent., payable Feb. 15.

North Carolina, semi-annual, 3 per cent., payable March 1.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Institute of Mining Engineers will hold its 18th annual meeting in Boston, Mass., Feb. 21.

The Western Society of Engineers holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The New England Railway Club meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The Boston Society of Civil Engineers holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The Western Railway Club meets in Chicago the third Wednesday in each month.

The Engineers' Club of St. Louis meets the first and third Wednesday of each month till June.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The General Time Convention, spring meeting, will be held in New York, April 11.

The National Association of General Passenger and Ticket Agents holds its annual meeting in St. Augustine, Fla., on March 20.

The American Society of Civil Engineers holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

Western Railway Club.

The next meeting of this club will be held in the Grand Pacific Hotel, Chicago, Wednesday, Feb. 15, at 2 p. m. The subjects for consideration are:

Effect of Magnetism on Watches. To be introduced by E. M. Herr, Chicago, Burlington & Quincy.

The Advantages of Using Six-wheel Trucks under Freight Cars of 60,000 lbs. Capacity. To be introduced by F. N. Barr, Chicago, Milwaukee & St. Paul.

New York Railroad Club.

The next meeting of this club will be held at their rooms, 113 Liberty street, Thursday, Feb. 16, at 7:30 p. m. The subject for discussion is car wheels and axles, fitting car wheels to axles and the guaranteeing of wheels. The rooms will be lighted by the Pintsch system of gas lighting, and Mr. Dixon, engineer of the Pintsch Company, will explain the workings of the system at the opening of the meeting.

PERSONAL.

—At a meeting of the Dunham Manufacturing Co., Feb. 6, in Boston, Mr. C. H. Dunham was elected President and General Manager of the company.

—It is reported from Chicago that E. P. Vining, late Commissioner of the Western Traffic Association, is to be named General Traffic Manager of the New York & New England.

—A. J. McDowell, who has been appointed General Auditor of the Mexican Central, held the same position with the New York, Lake Erie & Western for 12 years, and recently served as expert for the Pacific Railroads Commission.

—J. Lowrie Bell has tendered his resignation as General Traffic Manager of the Philadelphia & Reading, to take effect at the end of this month. He has been connected with the road since April, 1857, entering its service as a clerk in the Philadelphia freight station, and has occupied his present position four years.

—Col. Robert E. Ricker, who has been appointed General Superintendent of the St. Louis, Iron Mountain & Southern, has for the last four years been General Superintendent of the Denver & Rio Grande. He has had an extensive experience as engineer on new roads and as manager in various parts of the country, and was for about ten years Superintendent of the Central of New Jersey.

—Thomas A. Biddle, a leading banker in Philadelphia, died last week in his 74th year. At the time of his death he was a director of the Cumberland Valley, and was formerly connected with the management of the Chesapeake & Delaware Canal, the Little Schuylkill Railroad and the Allentown Iron Co. It is said that the firm of which Mr. Biddle was a member collected more Pennsylvania dividends than any other.

—Messrs. Theodore Cooper and Auguste Namur, civil engineers and architects, at 35 Broadway, New York, in addition to their bridge work, have charge of the iron work of the new union depot now building at Hartford; of the new ferry-house now building for the Hoboken Land & Improvement Co., at Barclay street, New York; the new South Brooklyn ferry houses in Brooklyn and New York, lately completed; the Brooklyn station of the South Brooklyn Railway & Tunnel company, now building; and stations for the Suburban Rapid Transit road, just finished. They are also making studies for new yards, stations and shops on the line of the Mexican National Railway.

ELECTIONS AND APPOINTMENTS.

Boston & Maine.—George E. Todd has been appointed Superintendent of Transportation of the Northern of New Hampshire and the Concord & Claremont, which are operated by this company. Charles L. Stratton has been appointed Auditor. They held similar positions under the former management.

Brunswick & Western.—George W. Haines has been appointed superintendent.

Central of Georgia.—Charles Blackwell has been appointed Engineer of the Machinery Department, with office at Savannah, Ga.

Chicago, Burlington & Quincy.—R. Mc. Smith has been appointed Traveling Passenger Agent, with headquarters at Cleveland, Ohio, vice A. G. Shearman, resigned.

A. C. Sheldon has been appointed Passenger and Freight Agent for Montana, Idaho, Oregon and Washington Territory.

Chicago & Eastern Illinois.—D. R. Patterson has been appointed General Superintendent.

Chicago, Lodi & Southeastern.—The directors of this Indiana company are: Thomas N. Rice, of Rockville, Ind.; W. F. Darwin and L. B. Jackson, of Chicago; J. S. Nave, of Attica, Ind.; A. C. Babcock, of Canton, Ill.; Otto Gresham, of Indianapolis; and Homer Sewell, of Covington, Ind. The following officers were elected: President, T. N. Rice, of Rockville; Secretary and Treasurer, Otto Gresham, of Indianapolis.

Chicago, Milwaukee & St. Paul.—S. J. Collins has been appointed Superintendent of the Chicago Division, and the Chicago & Council Bluffs Division in Illinois, with headquarters in Chicago, vice G. O. Clinton, resigned. H. R. Williams has been appointed Superintendent of the Ottumwa & Kansas City line, with headquarters at Kansas City, vice S. J. Collins, resigned. C. A. Goodnow has been appointed Superintendent of the James River Division, with headquarters at Aberdeen, Dak., vice D. L. Bush, transferred to the Southern Minnesota Division.

Chicago, Rock Island & Colorado.—The incorporators of this Colorado company are: Joel F. Vail, William H. Griffith, Harland P. Parmalee, Charles W. Betts, and Henry F. Jolly, of Denver.

Chicago, St. Paul, Nebraska & Kansas.—The directors of this company are: Harris M. C. Page, Edward R. Rose, C. J. Harris, C. T. Hamilton, of Kansas; Arthur W. Dole, Lewis E. Walker and E. E. McCorkle, of Nebraska.

Chicago, & South Atlantic.—The incorporators of this Tennessee company are: E. B. Stahlman, Edward Baxter, R. B. Champe, James L. Gaines and J. N. Brooks.

Dallas & New Orleans.—The directors of this company, which was reported last week, are as follows: James B. Simpson, T. J. Oliver, Dallas, Tex.; W. C. Connor, C. H. Hoffmann, J. Duncan Smith, Edinburgh, Scotland; D. W. C. Smith and Ernest Zuccani.

Delaware, Lackawanna & Western.—Louis Kistler has been appointed Master Mechanic of the Oswego & Syracuse and Binghamton divisions, vice James Buchanan, resigned.

Dunkirk, Allegheny Valley & Pittsburgh.—Charles G. Thayer has been promoted to be Assistant Treasurer.

Fitchburg.—The following is a corrected list of the directors chosen at the annual meeting last week: Elijah B. Phillips, Robert Codman, Boston; Rodney Wallace, Charles T. Crocker, Fitchburg, Mass.; Franklin N. Poor, Somerville, Mass.; Frederick L. Ames, Easton, Mass.; George Heyward, Concord, Mass.; Daniel Robinson, Troy, N. Y.; William Seward Webb, Francis Smith, Augustus Kountze, New York City.

Fort Wayne & Jackson.—At the annual meeting of this company the following directors were elected: Samuel Sloan, William S. Sloan, R. G. Ralston, Lawrence Turner, W. D. Seales, Henry Ceste, S. S. Palmer, Amos Root, Dwight Merriman, James F. Joy and Percy R. Pyne.

Fort Worth & Denver City.—W. V. Newlin has been appointed Assistant General Freight Agent, with headquarters at Fort Worth, Tex.

George Ady has been appointed General Passenger and Ticket Agent, with headquarters at Denver, Col.

Huntingdon & Broad Top Mountain.—At the annual meeting held in Philadelphia lately the following directors were elected: Rathwell Wilson, John Devereaux, I. V. Williamson, James Long, James Whittaker, Thomas R. Patton, Jacob Naylor, Spencer M. Janney, William J. Barr, M. E. McDowell, William Cochran and John B. Wattson. B. Andrews Knight was elected President.

Kansas City, Watkins & Gulf.—The directors of this new Kansas company are: J. B. Watkins, W. J. Patterson and D. M. Sprinkle, Lawrence, Kan.; Alexander Thompson, Lake Charles, La.; M. J. Dart, Dallas, Tex.; Henry Dickinson, New York City, and Henry G. Chalkley, London, England.

Lake Erie & Western.—O. W. Bell has been appointed Master of Transportation and Superintendent of Telegraph, with office at Indianapolis, Ind.

Lincoln, Colorado & Western.—The incorporators of this Kansas company are: A. F. Williams, H. P. Dillon, J. W. Veale, Jr., R. W. Jenkins, L. S. Wilson, D. C. Lockwood, Charles Monroe, Jacob Smith, R. W. Blair, of Topeka.

London & Port Stanley.—At the annual meeting held in Toronto, Ont., the following directors were elected: Joseph Hickson, Charles Stiff, J. Hobson, Robert Pritchard, Andrew Cleghorn, W. J. Reid, James Egan, George S. Birrell and John McClary. James Egan was elected President.

Long Beach.—The following directors have been elected: M. C. Fitch, D. G. Presson, C. C. Cressy, J. O. C. Rose, F. W. Homans, G. Steele, R. R. Fears, T. Hodge and D. D. Saunders, of Gloucester, Mass. F. W. Homans was also elected Treasurer.

Louisiana, Arkansas & Missouri.—At the annual meeting last week the following directors were elected: A. W. Soper, J. J. Slocum, H. M. Hoyt, New York City; Logan H. Roots, Little Rock, Ark.; William Block, O. M. Norman, L. Salinger and Parker C. Ewan, Clarendon, Tex. The following officers were also elected: President, A. W. Soper; Vice-President, Logan H. Roots; Secretary, J. J. Slocum; Treasurer, H. M. Hoyt.

Massillon & Cleveland.—At the annual meeting held in Massillon, O., Feb. 7, the following directors were elected: L. H. Meyer and Charles W. Cass, New York City; J. N. McCullough and John J. Haley, Pittsburgh, Pa.; John Sherman, Mansfield; P. G. Albright, Massillon, and George T. Perkins, Akron, O. The following officers were also elected: L. H. Meyer, President; John J. Haley, Secretary and Treasurer.

Mexican Central.—Alexander J. McDowell has been appointed General Auditor, with office at Boston, Mass., vice J. H. Goodspeed, resigned.

Mobile & Ohio.—S. B. Webb has been appointed traveling passenger agent, with headquarters at Montgomery, Ala. C. Bostwick has been appointed traveling passenger agent, with headquarters at Atlanta, Ga.

Newark, Somerset & Straitsville.—At the annual meeting of this company (the Straitsville Division of the Baltimore & Ohio) the following directors were elected: Samuel Speer, Baltimore; W. W. Peabody, Orland Smith, Cincinnati; James H. Collins, Columbus; R. T. Deuris, A. W. Dennis, Newark; Washington Comen and John Reid, Mansfield; and David Lee, Zanesville. The directors elected the following officers: President, W. W. Peabody; Secretary and Treasurer, J. H. Sutor.

New York & Ohio.—The incorporators of this Ohio company are David M. Yeomans, Henry L. Burchman, Edwin M. Yeomans, David Kay, and George A. Griswold.

New York Central & Hudson River.—James Buchanan has been appointed Superintendent of Motive Power of the Mohawk, Hudson and Harlem divisions, with headquarters at West Albany.

New York & New England.—R. E. Rockwell has been appointed Purchasing Agent, with office at Boston, vice W. W. McKim, resigned.

New York, Lake Erie & Western.—P. T. Donohue has been appointed Chief Paymaster, vice C. W. White, resigned.

Ohio, Indiana & Western.—C. E. Henderson has been appointed General Manager of this road, which is the reorganized Indiana, Bloomington & Western.

Omaha, Horace & Southwestern.—The incorporators of this company, which was reported last week, are as follows: W. K. Carlisle, C. C. Furley, P. V. Healey and E. D. Holbrook, of Wichita, Kan.; J. R. Borders, of Coolidge, Hamilton County; L. C. Clark and A. C. Fulkerson, of Horace, Greeley County, Kan.

Oregon Pacific.—F. W. Bowen has been appointed assistant to the General Manager, vice L. G. Cannon, resigned.

Pacific & Great Eastern.—The following directors have been elected: B. R. Davidson, David Dean, H. H. Dorsey, Geo. S. Albright, J. H. Van Hoose, E. B. Harrison and P. F. Davidson. The directors appointed the following officers: President, B. R. Davidson; Vice-President, David Dean; Treasurer, H. H. Dorsey; Secretary, P. F. Davidson; General Superintendent, George S. Albright.

Falmouth.—The directors of this California company are: H. C. Campbell, O. C. Miller, F. M. Butler, S. W. Ferguson and Lovell White, of San Diego County.

Pittsburgh & Lake Erie.—A. E. Clark has been appointed General Passenger Agent, vice A. D. Smith.

Providence & Worcester.—At the annual meeting held in Providence, Feb. 6, the following directors were elected: Elijah B. Stoddard, Jonas G. Clark, George S. Barton, Joseph E. Davis, Waldo Lincoln, Worcester, Mass.; Charles E. Whiting, G. Marston Whiting, Whitsonville, Mass.; Benjamin F. Thurston, John W. Danielson, Frederick Grinnell, Providence, R. I.; M. B. I. Goddard, Warwick, R. I.; Gideon L. Spencer, Pawtucket; Lyman A. Cook, Oscar I. Rathburn, Woonsocket, R. I., and George F. Blake, Jr.

St. Louis, Iron Mountain & Southern.—R. E. Ricker has been appointed General Superintendent.

Savannah, Florida & Western.—A. A. Aveilhe has been appointed assistant superintendent, vice George W. Haines, resigned.

Susquehanna & Clearfield.—At the annual meeting held last week the following directors were elected: John P. Green, Wistar Morris, G. B. Roberts, N. P. Shortridge, H. D. Welsh, and J. P. Wetherill. J. N. Du Barry was elected President.

Texas & Pacific.—E. L. Sargent has been appointed Traveling Passenger and Ticket Agent, with headquarters at El Paso, Texas.

Union Pacific.—J. M. Betchal has been appointed General Agent in Chicago, vice C. E. Ward, resigned.

Waco & Brazos Valley.—The incorporators of this company are James I. Moore, Ed. Rotan, J. W. Mann, Wm. Cameron, Samuel Sanger, John A. J. Caruthers and James B. Baker, of McLennan County, forming the first board of di-

rectors, and L. Sanger, J. T. Davis, S. W. Slayden, W. W. Soley, J. S. Thompson, B. S. Moore, J. C. Frazier and John T. Battle, of McLennan County. William Cameron was elected President.

Walkill Valley.—The following appointments have been made: Charles W. Bradley, General Superintendent, with office at Weehawken, N. J., vice George H. Graves, resigned; J. P. Bradfield, Superintendent, Kingston, N. Y.; William Buchanan, Superintendent of Motive Power and Rolling Stock, and Walter Katte, Chief Engineer, New York. These officers all hold the same positions on the West Shore.

Western & Atlantic.—At the annual meeting of the lessees last week the following officers were elected: Joseph E. Brown, President; C. T. Watson, Secretary and Treasurer; R. A. Anderson, Superintendent. The Executive Committee consists of Joseph E. Brown, Richard Peters, W. T. Walters, E. W. Cole, H. B. Plant, W. D. Grant, H. I. Kimball.

Wheeling & Lake Erie.—At the annual meeting last week the old Board of Directors was re-elected as follows: George J. Forrest, George R. Sheldon, Melville E. Day, D. E. Garrison, S. C. Reynolds, M. D. Woodford and J. J. Warwick.

Williamsburg, Marlboro & Buffalo.—The following officers of this lately incorporated company have been elected: President, Leonard Dodge, Buffalo, N. Y.; Vice-President, Charles A. Pooley, Buffalo; Secretary, J. S. Moore, Buffalo; Treasurer, James Chalmers, Jr., Williamsburg; Attorney, James Frazer Gluck, Buffalo; Chief Engineer, Jasper I. Youngs, Williamsburg. The executive committee is as follows: Leonard Dodge, Charles A. Pooley, Christopher Smith, William B. Sirett, Henry Moest, Buffalo; Henry L. Fogelson and John M. Long, Williamsburg.

OLD AND NEW ROADS.

Aberdeen, Bismarck & Northwestern.—Senator Davis has introduced a bill in Congress granting this road the right of way across the Sioux Reservation in Dakota. The road is being graded into Bismarck.

Alabama Great Northwestern.—It is said that the contracts for the construction of this road from Montgomery to Jasper, Ala., will be let within 30 days. The company was chartered last fall to build a road from Montgomery northwestward to the state line between Alabama and Mississippi, and is a continuation of the Alabama Midland. L. S. Proctor, Montgomery, Ala., is Chief Engineer.

Alabama Great Southern.—H. C. Jackson has contracted to build a depot at Chattanooga, Tenn., for thus road.

Alabama Midland.—It is reported that bids for the building of this road will be let. O. C. Wiley, Troy, Ala., is President.

Aspen & Western.—Tracklaying has commenced on this road, which runs west about 15 miles from a point in Pitkin County, Col., north of Aspen, on a projected line of the Denver & Rio Grande, to coal lands in the western part of the state. The track will be laid by the Denver & Rio Grande, and it is expected will be completed by Feb. 15.

Atchison, Topeka & Santa Fe.—The Kiowa branch with the Texas Panhandle has been opened for business to Panhandle, Carson County, and construction work will stop there for the present.

Atlantic & Blue Ridge.—Work will be commenced on this road in April. It extends from Tallulah, Rabun County, Ga., to Maryville, Blount County, Tenn., about 130 miles.

Bay View, Little Traverse & Mackinaw.—This road, which extends from Petoskey, Mich., on the Grand Rapids & Indiana, west six miles to Harbor Springs, on Lake Michigan, has been bought at mortgage sale by the latter company, which owns all the bonds (\$25,000) and a majority of the stock, and operates the line.

Belfast & Moosehead Lake.—The stockholders have authorized the directors to issue bonds for \$150,000 for the renewal of the first mortgage bonds of the same amount, with interest at 5 per cent, for four years and for 28 years thereafter at 4 per cent. The road extends from Belfast to Burnham, Me., 38 miles, and is leased to the Maine Central.

Boston & Albany.—The report of earnings and expenses for the quarter ending Dec. 31, as submitted to the New York Railroad Commissioners, is as follows:

	1887.	1888.	Inc.	P. c.
Gross earnings.....	\$2,404,327	\$2,196,144	\$298,183	9.6
Op. expenses.....	1,556,315	1,513,394	42,921	2.9
Fixed charges.....	715,057	625,032	90,025	14.4
Net income	132,955	57,717	75,238	130.4

Carolina, Knoxville & Western.—The contract for grading this road from Knoxville, Tenn., east to the boundary line between South Carolina and North Carolina, near Greenville, S. C., has been let. The road is expected to be in operation between Knoxville and Greenville within 12 or 15 months. Major Gordon Gardner, Augusta, Ga., is Chief Engineer.

Central Iowa.—A final decree of foreclosure of the Illinois Division of this road was entered last week by Judge Gresham in Chicago. It orders the payment of \$1,708,956 on the first mortgage to the Central Trust Co., of New York, within ten days; in default of this the road is to be sold March 17. Three hundred thousand dollars has been fixed as the minimum bid to be received; of this \$250,000 must be in cash, \$20,000 for costs and claims due prior to the first mortgage, and the remainder can be Illinois Division bonds. It is understood that the road will be bought by and in the interest of the Chicago, St. Paul & Kansas City.

Charleston, Cincinnati & Chicago.—J. B. Merrill and G. H. McFalls, Forest City, N. C., have received the contract to grade part of the road from Rutherfordton, Rutherford County, to Marion, McDowell County, N. C.

Chattanooga, Rome & Columbus.—The locating engineers have reached Carrollton, Ga., finishing the survey of the line from Chattanooga to that point. It is expected that the road will be in operation to Carrollton by August. The right of way between Columbus and Cedartown has been secured, and graders are at work near Buchanan. When the line is located to Carrollton the preliminary survey to Columbus and Montgomery will be commenced. L. Rossiter, Tallapoosa, Ga., and C. E. James, Chattanooga, Tenn., have contracts for building and grading part of the line.

Chicago & Calumet Terminal.—It is expected that this road will be completed to Lake Michigan during April. The stockholders recently authorized the issue of \$7,000,000 of bonds for the completion of the road.

Chicago, Hannibal & Springfield.—The preliminary surveys for this road, which was lately incorporated in Missouri, have been completed from Centralia, Boone

County, northeast to a point in Ralls County. Another survey has also been made via Mexico, Audrain County, but it has not yet been decided which survey to follow. Part of the route will follow the old grade of the Louisiana & Missouri, and it is expected that part of the road will be in operation within twelve months. M. G. Quinn is in charge of the surveying engineers.

Chicago, Lodi & Southeastern.—Articles of incorporation have been filed in Indiana to build a road from Covington south through the counties of Fountain, Parke and Vigo, to Terre Haute, a distance of 54 miles, with a branch through Fountain, Parke and Clay counties to Brazil, a distance of 36 miles, a total of 90 miles. The road will pass through coal lands, and from Covington to Terre Haute it will follow the line of the old Wabash & Erie Canal. The capital stock is \$1,500,000.

Chicago, Madison & Northern.—This road has been put in operation between Madison, Wis., and Freeport, Ill., about 60 miles. The road has just been completed between these points.

Chicago, Milwaukee & St. Paul.—The contract is about to be let, it is said, for the extension from Tomahawk Lake to Marinesco. The line is to be extended from Tomahawk Lake to L'Anse, Mich., about 90 miles.

Chicago, Rock Island & Colorado.—The charter of this company has been filed in Colorado to build a road from a connection with the Chicago, Kansas & Nebraska at the Kansas and Colorado state line, in Elbert County, west to Colorado Springs, about 150 miles, with branches to Denver and Pueblo. The capital stock is \$5,000,000. It is a Chicago, Rock Island & Pacific enterprise.

Chicago, St. Paul, Nebraska & Kansas.—Articles of consolidation have been filed in Kansas by the Chicago, St. Paul & Kansas, and the Kansas, Nebraska & Decatur. The road commences at a point near Decatur, Neb., and runs southerly to Meade County, in Kansas. There are also branches from Salina to El Dorado; from Salina to Downs or Osborne, and from Ellsworth County to the west line of the state. The capital stock is \$18,000,000, and the general offices are at Salina.

Chicago & South Atlantic.—Articles of incorporation filed in Tennessee to build a road from a point near Clear Fork Creek, near the boundary line between Kentucky and Tennessee, to its headwaters, then down little Yellow Creek to Cumberland Gap, in Claiborne County, in the eastern part of the state, near the Kentucky state line.

Cincinnati, Indianapolis, St. Louis & Chicago.—A new issue of 50-year consolidated mortgage 4 per cent. bonds is advertised, Drexel, Morgan & Co., having made a contract with the company to convert its outstanding divisional and consolidat d bonds into 4 per cent. general first mortgage bonds.

Concord.—It is rumored that the Boston & Maine interest is likely to obtain control of this road by purchasing a majority of the stock, thus accomplishing the end they endeavored to attain a few months ago through a lease, but which was blocked by adverse legislation.

Delphos & Northwestern.—Articles of incorporation have been filed by this company in Ohio. The capital stock is \$50,000. Principal office is at Delphos, Ohio.

Dennison, Bonham & New Orleans.—At a meeting of the stockholders of this company it was resolved to bond the road at \$48,000 per mile and complete the road to Bonham, Tex., immediately. Work will commence in two months. The company was organized about a year ago to build a road from Denison, Tex., to Shreveport, La., via Bonham, and the line is already surveyed between Bonham and Cooper. S. B. Allen, Bonham, Tex., is President.

Dexter & Newport.—It is proposed to extend this road from Dexter, Penobscot County, Me., nor'theast to Dover and Foxcroft, Piscataquis County, about 15 miles, or to Guilford, directly north. The road runs from Newport to Dexter, 14 miles, and is leased to the Maine Central. C. H. Pense, of Dexter, is President.

Duluth, Northwestern & Winnipeg.—It is expected that the survey of this road, which was recently incorporated to build a line from Knife Falls, near Duluth, to the headwaters of the Mississippi, will be commenced on the section between Cloquet, Carlton County, Minn., and Grand Rapids, which is about 60 miles long; work will be commenced in the spring, and this portion of the line completed this year. It is said that the Duluth, South Shore & Atlantic will aid the line.

Elton, Denton & Lake Charles.—This company has been organized in Maryland to build a road from Denton, Md., to Baltimore, by G. W. Goldsborough and others. County aid is expected.

Eureka Springs.—It is said that the St. Louis & San Francisco is considering the advisability of extending this road from Eureka Springs, Carroll County, Ark., its present terminus, to Little Rock, by way of Harrison, about 180 miles. The road at present extends from Seligman, Barry County, Mo., on the St. Louis & San Francisco, to Eureka Springs, 18 miles.

Fitchburg.—Six switching and four passenger engines have been ordered of the Taunton Locomotive Works. Several of the engines bought with the Troy & Boston and Boston, Hoosac Tunnel & Western roads will be sent to the scrap heap before long. One span of the Green River bridge has been finished and the workmen have been taken to Hoosick Falls, where two new iron bridges are in course of construction. As they are both on the west-bound or former Troy & Boston track the Boston, Hoosac Tunnel & Western is used temporarily by trains in both directions between Hoosick and Hoosick Junction. The new freight yard at Fitchburg has proved of much use this winter. Notwithstanding the recent heavy snow-storm, the accumulated cars have all been taken care of without difficulty. The Williamstown yard will not be utilized before spring. The roundhouse there will probably be doubled in size this year. The company is building a station at Hoosick Junction, and a handsome one at Waltham, which is nearly completed.

Florida Central & Western.—As announced, the sale of this road occurred at Jacksonville, Fla., on Feb. 6, and the property was bid in by W. Bayard Cutting, of New York City, for the benefit of the reorganization committee of the Florida Railway & Navigation Co., for \$1,210,000, \$100,000 being paid in cash. It is a branch of the Florida Railway & Navigation line, extending from River Junction to Jacksonville, Fla., 241 miles.

Fort Worth & New Orleans.—It is expected that this road, which extends from Waxahachie, Tex., to Fort Worth, will be extended to New Orleans, and that work between Corsicana and Fairfield will be commenced soon. W. S. Haywood, Fort Worth, Tex., is Chief Engineer.

Fort Worth & Rio Grande.—It is said that the contract for the extension of this road to Brownwood, Tex., will be let in a few days. Captain P. H. Thrash is Engineer.

Garvanza.—Tracklaying on this California road, nine miles long, is completed, except about three miles. N. M. Cutler has the contract.

Grand Island & Wyoming Central.—Tracklaying on this road, which is a branch of the Burlington & Missouri River, has reached Grand Lake, Box Butte County, in the northwest part of Nebraska. At Grand Lake one branch extends north to Hemingford, in Box Butte County, then northwest to a point three miles east of Fort Robinson, Dawes County, near Crawford, on the Fremont & Elkhorn Valley, and then to the grazing regions of Northeastern Wyoming.

Another branch has been graded for 14 miles west of Grand Lake, and will continue west until it strikes the North Platte River, then to Douglas, Albany County, Wyo., on the Fremont & Elkhorn, and the coal fields of Wyoming.

Grand Trunk.—Work will be resumed on the tunnel underneath St. Clair River, at Port Huron, Mich., in the spring. The 6-ft. experimental tunnel has been abandoned and a single track 20-ft. tunnel will be constructed.

Houston & Texas Central.—This road will probably be extended from Roberts, Hunt County, to Paris, in the northern part of the state. G. A. Quinlan is Superintendent, Houston, Texas.

Illinois Central.—Five million 4 per cent. bonds, out of a total issue of \$15,000,000, are offered in New York, London and continental markets. The issue is to be secured by deed of trust to the United States Trust Co., transferring to the trustee first-mortgage 5 per cent. bonds to an amount not to exceed \$20,000 per mile on 850 miles of completed railroads of various subsidiary companies.

Notices of a suit brought against the Dubuque & Sioux City by Morris K. Jesup and George J. Forest, trustees, have been served on this company. The attorneys were not notified of the nature of the suit, but believe that it concerns the guaranteeing of the bonds of Cedar Falls & Minnesota by the Dubuque & Sioux City, to which it is leased. The case comes up at the April term of the United States Court in Chicago.

Jacksonville & Gulf.—Articles of incorporation for a company of this name have been filed in Florida by A. S. Rowley, Samuel Barton and others.

Johnson City Belt.—Articles of incorporation have been filed in Tennessee to build a belt road around Johnson City. F. A. Stratton is President.

Kansas City, Fort Scott & Gulf.—It is said that this road will build a second track between Kansas City and Olathe. It is also said that extensive improvements requiring new bridges and heavier steel rails will be made.

Kansas City, Watkins & Gulf.—Articles of incorporation have been filed in Kansas for a line of this name which appears to start in the southern part of Arkansas or Indian Territory and runs northwardly to the southeastern corner of Kansas; thence it runs through the counties of Cherokee, Crawford, Bourbon, Linn, Miami, Johnson and Wyandotte, in the eastern part of Kansas to Kansas City, Mo., then in a westerly direction through Wyandotte, Johnson, Douglass and Shawnee counties to a point on the west line of Shawnee County, Kan. The length of the road will be 550 miles, of which 250 will be in Kansas. The capital stock is \$5,000,000, and the principal offices will be in Lawrence, Kan.

Kansas Midland.—This line, a branch of the St. Louis & San Francisco, extending from Wichita to Ellsworth, Kan., 104 miles, has been opened for business. It connects at Ellsworth with the Kansas Division of the Union Pacific.

Kentucky.—Bills have been introduced in the Kentucky Legislature to incorporate the Kentucky, Tennessee & Southern, the Litchfield & Green River, the Henderson & Knoxville, the Cumberland & Mississippi River, the Louisville, Hardinburg & Western, the Richmond, Irvine & Beattyville, and the Paducah & Jackson railroad companies.

Lake Erie, Alliance & Southern.—The employees have been notified of a reduction of 10 per cent. in their wages.

Lincoln, Colorado & Western.—Charter filed in Texas to build a road from Plainview, Roots County, to the west line of the State in Sherman County, west through Rock, Graham, Sheridan, Thomas and Sherman, about 150 miles. The capital stock is \$1,000,000.

Little Rock & Eastern.—It is said that the terminal point of this road will be changed from Little Rock to Hot Springs, further west, crossing the Arkansas River about ten miles south of Little Rock. The company was organized about a year ago to build a road from Althiemer, Jefferson County, to Little Rock, about 50 miles.

Long Beach.—This road was incorporated in Massachusetts last week to build a light railroad for summer traffic from Gloucester to Rockport, about three miles. The capital stock is \$30,000. The contracts for ties and rails have already been made, and work will commence in the spring.

Louisiana, Arkansas & Missouri.—The surveys for this road from Brinkley, Ark., to Alexandria, La., are nearly completed and it is expected that the work of clearing the right of way will be commenced soon. Several counties along the line have voted aid to the road.

Louisville & Nashville.—The Attorney-General of Florida has commenced action against this company and the Pensacola & Atlantic for a penalty in each case of \$5,000, for refusal to comply with the recent law regulating passenger rates. They are the only two companies in Florida not complying with the tariff prescribed by the state commission.

Lynchburg & Durham.—The contracts for the construction of this road are expected to be let to a New York company, and it is expected that work will be commenced within a month. P. J. Otey, of Lynchburg, Va., is President.

Macon, Tuscaloosa & Birmingham.—A bill has been introduced in the Mississippi Legislature to incorporate a company of this name.

Maine Central.—The directors at a recent meeting voted to have seven or eight short wooden bridges between Portland and Bangor replaced with iron structures at an estimated cost of \$50,000. They have also decided to construct 400 flat and 400 box cars at the Waterville shops during the year.

A committee was also appointed to confer with a commit-

tee appointed by the Portland & Ogdensburg, in regard to a lease of the latter line.

Marietta & North Georgia.—The consolidated first mortgage bonds, amounting to \$3,300,000, have been sold and active work on widening the gauge has commenced. It is expected that the road will be in operation between Marietta and Murphy, N. C., within a month: C. R. Walton is Chief Engineer.

Maysville & Big Sandy.—A meeting of the stockholders of this company will be held at Maysville, Ky., to vote upon placing a mortgage upon the entire line in favor of the Union Trust Co., of New York, and also to consider the issue of bonds under the mortgage. It is a new road building between Ashland and Cincinnati—135 miles—to connect the Chesapeake & Ohio with the latter city. The Cincinnati, Indianapolis, St. Louis & Chicago interest is closely allied with the new line.

Mexican Central.—Track on the Guadalajara Branch, which is about 150 miles in length, has been laid for about 93 miles to Salome, where it crosses the river Lerma for the second and last time. A temporary structure to be built across the river will require two or three weeks to complete, and then tracklaying will be resumed. The iron bridges to be built at Salome and San Piedad have been contracted for by the Phoenix Bridge Co. of Philadelphia, Pa.

Mexican National.—Work has been commenced on the iron bridge across the Rio Grande River, near Laredo. Joseph Hampson, Clayo, Mexico, has the contract for building this road from Saltillo to San Miguel, about 365 miles. Two forces of men are at work, 4,000 on the southern division and 2,500 on the northern division, and it is expected that they will meet near San Luis Potosi about Sept. 1, completing the road from Laredo to the City of Mexico.

Moncton & Batouche.—This New Brunswick road was sold last week to an American company represented by Louis J. De Bertram, of Brooklyn, N. Y. The road will be completed, and may be extended to Kingston. It is 32 miles long.

Montana Central.—The grading on the branches of this road, from Great Falls to Sand Coulee, from Helena to Rimini, and from Marysville Junction to Marysville has been completed and tracklaying will begin in the spring. The main line to Butte will probably not be completed until next fall, the tunneling preventing rapid progress.

Montgomery & Florida.—This narrow gauge road was placed in the hands of a Receiver Feb. 4, on the application of McLaren & McLaren, contractors, who claim that the road owes them \$12,500, and that it is bankrupt and cannot pay. Major Bradford Dunham was appointed Receiver.

Montreal Elevated.—The Aldermen of Montreal have under consideration the plans of certain capitalists for an elevated railroad in that city. The project is for two lines of track along Craig street.

Montreal & Sorel.—This road, extending from St. Lambert, P. Q., to Sorel, 45 miles, has been opened for traffic. The road has a subsidy from the Canadian Government of \$72,000.

New York Central & Hudson River.—The statement of earnings and expenses for the quarter ending Dec. 31 is as follows :

	1887.	1886.	Inc. or Dec.
Gross earnings.....	\$10,020,225	\$9,012,256	I. \$988,969
Operating exps.....	6,470,510	5,458,749	I. 1,011,761
P.C. exps. to earn.....	64.57	60.51	.....
Net earnings ...	\$3,549,715	\$3,562,507	D. \$12,792
Fixed charges.....	3,954,860	3,957,500	D. 2,340
Profit	\$1,594,855	\$1,605,307	D. \$10,452
Dividend	894,283	894,283	.....
Surplus	\$700,572	\$711,024	D. \$10,452

New York, Lake Erie & Western.—This company has contracted for 1,000 coal cars divided among the Erie, Lafayette, and Bloomsburg Car Works, also 471 box cars between the Roanoke Machine Works and the United States Rolling Stock Co., and 15 consolidation locomotives from the Rogers Locomotive Works, five of which are to be for the New York, Pennsylvania & Ohio.

New York & Ohio.—Incorporated in Ohio to build a road from Kinsman, Trumbull County, in the northeastern part of the state west by south, through the counties of Trumbull, Geauga, Portage and Summit. The capital stock is \$1,000,000.

North Dakota & Duluth.—A bill has been reported favorably in the Senate to permit this road to build a bridge across the Red River of the North, in Marshall County, Minn.

Oregon Pacific.—It is said that the contractors are now at work on the Eastern Division of this road, about 49 miles above Ontario, Or., near the lower end of a cañon, extending up from the river 45 miles.

Pacific.—The special reports on the condition of the Pacific railroads have been referred in the United States Senate to a committee consisting of Senators Frye (Chairman), Dawes, Hiscock, Davis (of Minnesota), Morgan, Butler and Hearst.

Pacific & Great Eastern.—It is reported that the contract to build 20 miles of this road has been let. The road is projected to run from Fayetteville, Ark., to the Mississippi River. The general offices are at Little Rock, Ark.

Palmdale.—Incorporated in California to build a branch road from Seven Palms, San Diego County, on the Southern Pacific, to a point in section 25, township 4 S., range 4 E., 6½ miles distant. The capital stock is \$50,000; \$6,500 has already been subscribed.

Pensacola & Memphis.—The subscriptions of Pensacola, Fla., to the stock of this projected road have reached \$86,300, and it is believed that the amount necessary to complete the \$100,000 asked for will be raised during this month. The road is projected to extend from Pensacola, Fla., to Memphis, Tenn. Col. W. W. Higerford is General Manager.

Philadelphia & Reading.—This company has decided to abandon 12 miles of the Little Schuylkill Canal, from Schuylkill Haven to Port Clinton, Pa., on account of the expense of keeping the canal dredged to proper depth. Coal will be shipped in future from Port Clinton.

Providence & Worcester.—This company has asked for authority to increase its capital stock \$1,000,000 in order to increase its terminal facilities at Providence.

St. Joseph, St. Louis & Santa Fe.—The St. Joseph & Santa Fe, which was incorporated last Fall to build a line from Atchison, Kan., to St. Joseph and Carlton, Mo., 97 miles, in the interest of the Atchison, Topeka & Santa Fe, has consolidated with the St. Joseph & St. Louis, extending from North Lexington to St. Joseph, 76 miles; this was formerly a part of the Wabash system.

St. Louis, Arkansas & Texas.—The extension of this road from Corsicana to Hillsboro, Tex., about 40 miles, has been completed. The extension towards Fort Worth is completed as far as Plano.

St. Louis & Cairo Short Line.—The contract to extend this road from New Burnside Junction, Ill., to the Ohio River, has been awarded to N. W. Irish, Carlyle, Ill.

St. Louis & San Francisco.—An issue of \$7,144,000 general mortgage 5 per cent. bonds of this company is advertised in New York. The bonds are secured by mortgage to the United States Trust Company, and are now issued to provide for the retirement and cancellation of a like amount of outstanding South Pacific first mortgage 6 per cent. bonds, due July 1, 1888. The general mortgage is a first lien on 357 miles of road and equipment, and a second lien on 328 miles. It is said that this refunding will effect an annual saving of \$71,445 in interest. These bonds have all been purchased by J. & W. Seligman & Co., New York.

St. Paul, Minneapolis & Manitoba.—Grading on the Watertown division has been finished to Huron, Beadle County, Dakota.

Savannah, Griffin & North Alabama.—A bill has been filed by the minority stockholders joining the Central of Georgia from proceeding with the foreclosure of the mortgage of this company. The bill asks that certain parts of the alleged indebtedness of the road be canceled and that a receiver be appointed.

Seattle, Lake Shore & Eastern.—The building of the extension to Lewiston, Idaho, the coming summer, is said to be now assured, sufficient funds having been secured. F. H. Whitworth, Seattle, Wash. Ter., is Chief Engineer.

A cargo of 2,250 tons of steel rails has been received and the 13 miles necessary to complete the road to the Squak coal mines will be finished at once. Work on Hunt & Tatton's 40-mile contract will also be commenced. F. H. Whitworth, Seattle, W. Ter., is Chief Engineer.

Southern Pacific.—It is said that this company will remove its machine shops from Harrisburg to Houston, Tex.

Southern & Western Air Line.—The survey of this road from Shelby to Morganton, N. C., has been completed and the survey from that place to Cranberry is now in progress.

South Pennsylvania.—A Pittsburgh dispatch of Feb. 7 states that a new contract has been signed by the majority stockholders of this company by which it is expected that the road will be pushed to immediate completion. The proposition provides for an immediate cash subscription of 20 per cent., which will realize \$3,000,000. As soon as this is expended it is proposed to issue \$10,000,000 thirty year 6 per cent. gold bonds, which it is believed will be sufficient to complete the road and put it in operation. It is said that the Vanderbilts have agreed to subscribe \$3,000,000 of the new bonds, and Dr. Hostetter, Ralph Bagaley and Andrew Carnegie \$600,000 each. All suits against the company have been withdrawn, except those of the Pennsylvania road. It will be remembered that work was commenced on the road, extending from Harrisburg to Pittsburgh, in 1884, and connecting at Harrisburg with the Philadelphia & Reading, the object being to make the latter a trunk line. Work was abandoned when the West Shore settlement of 1885 was arranged, and the road was to be turned over to the Pennsylvania. The minority stockholders, represented by Ralph Bagaley and Mr. Hostetter, of Pittsburgh, opposed the abandoning of the project, and litigation was begun to compel the completion of the road and prevent its transfer to the Pennsylvania. The latter road subsequently procured an injunction to prevent any steps for building the line until the question of ownership was decided in the courts. The cases have never been settled. Representatives of the Vanderbilt interest in New York refuse to give any definite information concerning these reports, and it is not known what the attitude of the Pennsylvania towards the present scheme will be.

Swan Creek.—It is said that the Lake Shore & Michigan Southern has secured a 99-year lease of this road. It connects the Lake Shore with the Toledo, St. Louis & Kansas City.

Taylor, Bastrop & Houston.—It is expected that work will be resumed on this road within a month. The road has been graded to Sealy and track is laid as far as Fayetteville.

Tennessee Midland.—The grading on this road has been finished to Jackson, 85 miles northeast from Memphis, and is under contract to the Tennessee River, 135 miles. The track is laid from Jackson west about 15 miles, and work has been commenced at Memphis, working east. R. H. Temple, Richmond, Va., is Chief Engineer.

Texas & Pacific.—The work of improving the New Orleans division is expected to be finished early in the Spring. Between New Orleans and a point 6 miles beyond the Atchafalaya River the roadbed has been raised, and steel rails have been substituted for the iron ones.

Toledo, Ann Arbor & North Michigan.—President Ashley is reported as saying that this road will be extended from Cadillac, Wexford County, northwestward to the shore of Lake Michigan, about 45 miles.

Toledo, Peoria & Western.—The trustees of the first mortgage on this road have commenced action against the Wabash for \$360,000 rental, which they claim is due but has not been paid by Messrs. Humphreys and Tutt, the former receivers of the Wabash. The receivers claim that they paid \$99,000, the net earnings.

Upper Coos.—This company, which has lately operated its road from North Stratford, N. H., on the Grand Trunk, to Stewartstown, Coos County, N. H., 23 miles, has surveyed a line from Stewartstown to Basin, on the Quebec Central, and construction will commence in the spring.

Vincennes, Oakland City & Owensboro.—The survey of this road, which extends from Owensboro to Oakland City and Vincennes, has been completed. Near Lynnville, Warren County, Ind., 31 miles from Owensboro, a vein of bituminous coal was found.

Virginia.—Bills have been introduced in the Virginia Legislature to incorporate the New River Plateau Railroad, with a capital stock of \$200,000, John W. Robinson, Gram's Forge, Wythe County, Va., and others incorporators; the Princess Anne County Railroad, to build a line from the Norfolk & Virginia Beach road to Princess Anne C. H., with George R. Howell and others as incorporators.

Wabash.—Judge Gresham has authorized Receiver McNulta to purchase 6,000 tons of steel rails and expend \$150,000 in new bridges.

Waco & Brazos Valley.—Charter filed in Texas to build a road from Waco through Falls County to Cameron, Milam County, a distance of about 100 miles. The capital stock is \$1,000,000.

Washington & Idaho.—A bill was reported in the Senate Feb. 2, giving this company a right of way through the Coeur d'Alene Indian reservation.

West Jersey.—Bailey & Wilson have completed their work on a short extension of this road from Bridgeton, and it is now in operation.

West Virginia Central.—The extension of this road towards Leadville, Randolph County, W. Va., has been graded from Thomas, Tucker County, to Cheat River, 13 miles.

Winnipeg & Hudson's Bay.—In the suit of the contractors, Mann and Holt, to get possession of this road, judgment against the plaintiffs was rendered Jan. 31. An appeal will be taken. President Sutherland says that the work will now be continued. The road is projected to run from Winnipeg to Hudson's Bay, about 610 miles, and has a subsidy of 6,880,000 acres of land from the Canadian Government.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

July 1 to Dec. 31:

	1887.	1886.	Inc. or Dec.	P. c.
Louisv. & Nash.	\$8,624,298	\$7,662,707	I. \$861,591	12.6
Net.	3,520,819	3,229,020	I. 291,799	9.0
Northern Pac.	8,407,166	7,342,295	I. 1,064,871	14.5
Net.	4,131,585	3,970,126	I. 161,459	4.1
Ohio & Miss.	2,237,041	2,097,111	I. 139,930	6.7
Net.	824,639	726,150	I. 98,489	13.7
Plts. & West.	1,118,843	.....	.....	.....
Net.	319,656	.....	.....	.....
Tel. & O. Cen.	614,426	490,649	I. 123,777	25.2
Net.	227,470	170,470	I. 57,000	33.5

Month of October:

	1887.	1886.	Inc. or Dec.	P. c.
Ev. & Indianap.	\$20,242	\$19,852	I. \$390	1.9
Net.	7,890	7,132	I. 758	10.8
Ev. & Terre H.	78,303	68,728	I. 9,575	13.9
Net.	34,233	36,664	I. 2,231	8.8
Peoria, Dec. & E.	80,859	80,693	I. 166	0.2
Net.	39,209	45,797	I. 6,588	14.3

Month of November:

	1887.	1886.	Inc. or Dec.	P. c.
Lake E. & W.	\$172,616	\$146,633	I. \$26,013	17.7
Net.	60,617	42,267	I. 18,350	43.4

Month of December:

	1887.	1886.	Inc. or Dec.	P. c.
Balt. & Potomac.	\$10,983	\$10,349	I. \$10,634	9.8
Net.	37,113	30,356	I. 6,737	22.2
Cam. & Atl. & Brs.	33,724	29,597	I. 4,127	14.1
Net.	Def. 6,314	8,257	I. 1,943	.....
Canadian Pac.	1,151,741	894,100	I. 257,641	28.9
Net.	36,107	280,345	I. 83,462	29.8
Carolina Central.	48,695	46,219	I. 2,476	5.4
Net.	23,874	22,888	I. 988	4.3
Den. & R. G. W.	101,941	95,693	I. 6,248	6.5
Net.	21,682	30,031	D. 17,349	44.5
Louisv. & Nash.	1,449,562	1,278,717	I. 170,845	13.3
Net.	573,179	538,685	I. 36,494	6.8
Met. Col. & Nor.	6,773	4,613	I. 2,160	47.0
Net.	2,729	.....	.....	.....
Northern Pacific.	1,181,773	800,665	I. 282,108	31.3
Net.	472,906	383,708	I. 89,288	23.3
Ohio & Miss.	345,013	296,918	I. 49,001	16.5
Net.	112,614	80,465	I. 32,149	40.2
Phil. & Erie.	328,637	301,174	I. 27,463	9.2
Net.	87,007	91,886	D. 4,870	5.3
Seat. Rd. & Roan.	67,486	54,693	I. 12,793	23.3
Net.	35,991	20,993	I. 14,998	71.4
Shenandoah Val.	71,223	54,315	I. 16,908	31.3
Net.	Def. 992	3,900	I. 4,892	12.2
Tel. & Ohio Cent.	110,240	99,872	I. 10,368	10.5
Net.	45,036	47,588	D. 2,552	5.3
W. Jer. & Brs.	98,987	83,569	I. 15,328	18.2
Net.	Def. 3,968	13,756	D. 19,724	123.3

Total (gross)..... \$5,110,821

Total (net)..... 1,763,925

Year to December 31:

	1887.	1886.	Inc. or Dec.	P. c.
Balt. & Potomac.	\$1,447,322	\$1,345,873	I. \$101,459	7.5
Net.	538,955	513,016	I. 25,939	5.1
Cam. & Atl. & Brs.	678,644	599,091	I. 70,553	13.3
Net.	138,563	129,775	I. 8,788	6.8
Canadian Pac.	11,606,412	10,801,803	I. 1,524,609	15.1
Net.	3,504,118	3,703,487	I. 190,369	5.4
Den. & R. G. W.	1,181,324	1,057,003	I. 124,231	11.7
Net.	341,868	361,099	I. 20,231	5.3
Louis. & Nash.	16,044,473	13,978,546	I. 2,065,927	14.8
Net.	6,251,557	5,522,115	I. 729,442	13.1
Northern Pacific.	13,854,320	12,329,552	I. 1,524,768	12.3
Net.	6,046,290	6,140,372	D. 94,082	1.5
Ohio & Miss.	4,128,365	3,827,831	I. 300,534	8.1
Net.	1,436,441	1,150,107	I. 286,334	24.4
Phila. & Erie.	4,036,931	3,708,484	I. 328,447	8.9
Net.	1,579,884	1,465,952	I. 13,932	7.8
Shenandoah Val.	902,862	740,654	I. 162,208	21.9
Net.	129,316	116,650	I. 12,657	10.8
Tol. & Ohio C.	1,085,186	844,799	I. 240,387	28.4
Net.	373,019	270,629	I. 102,390	37.8
West J. and Brs.	1,469,215	1,352,458	I. 116,757	8.6
Net.	492,957	503,274	D. 10,317	2.1

Total (gross)..... \$56,435,064

Total (net)..... 20,832,968

Jan. 1 to Oct. 31:

	1887.	1886.	Inc. or Dec.	P. c.
Evans. & Ind.	\$106,611	\$161,418	I. \$35,103	21.8
Net.	.....	.....	.....	.....
Ev. & Terre H.	738,161	639,229	I. 98,932	15.5
Net.	387,685	344,374	I. 43,311	12.8
Peoria, Dec. & E.	716,546	672,662	I. 43,884	6.5
Net.	337,244	334,985	I. 2,250	0.7

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Coal.

The coal tonnages for the week ending Feb. 4 are reported as follows:

	Coal.	Coke.	Total.	P. c.
Anthracite	508,767	650,362	D. 81,595	12.5
Bituminous	325,333	278,371	I. 46,962	17.9

The coal tonnages of the Pennsylvania road for the last two years are reported as follows:

	1888.	1887.	Inc. or Dec.	P. c.
Year 1887.....	10,508,603	3,762,779	I. 14,271,382	.....
Year 1886.....	8,740,472	3,549,645	I. 12,290,117	.....

The Cumberland coal trade for the week ending Feb. 4 amounted to 49,366 tons, and for the year to that date, 298,702 tons.

Cotton.

The cotton movement for the week ending Feb. 3 is reported as follows, in bales:

	Receipts.	Shipments.	Stock.	Exports.	Imports.
Year 1887.....	98,668	130,753	336,612	D. 32,085	24.5
Year 1886.....	102,385	131,037	337,556	D. 28,652	21.9
Stock.....	942,712	922,643	I. 20,069	D. 22,409	2.2

Demoralized Freight Rates.

Freight rates in the Northwest, which have been unsettled for some time, have become seriously demoralized within the past week, and a prolonged contest seems probable. The Chicago, Milwaukee & St. Paul has given notice of withdrawal from the Western and Northwestern Freight Bureau, and it is believed that this will precipitate the dissolution of the association. The Chicago, Burlington & Northern is said to make rates between the seaboard and St. Paul the same as those announced by the route via Sault Ste. Marie (90 cents first class, New York to St. Paul), using the Chicago & Grand Trunk (and the Central Vermont, probably) for an eastern connection. This depressed rates on all the lines, 80 cents (first class), Chicago to St. Paul, being generally quoted. The Pennsylvania promptly agreed to bear a portion of the reduction necessary to compete with the Sault Ste. Marie route, and this necessitated the issue by Commissioner Fink of a through tariff over all the trunk lines, which is on a basis of \$1 first class New York to St. Paul, the proportion east of Chicago being 70 cents. On Feb. 2 rates between Chicago and Omaha were reduced nearly one-half, tariffs issued the following day being based on 40 cents first class, and Kansas City and other Missouri river points being included by the Chicago, Burlington & Quincy. The Chicago & Northwestern tried hard to induce the other roads to refrain from such severe cutting, but to no avail. The peculiar relations of the Chicago, Milwaukee & St. Paul and the Chicago, Burlington & Quincy, each having a new line parallel to the other's old one, have been a prominent factor, as in previous wars. Rates between St. Louis and Kansas City are down to 20 cents (first class).

On Friday, a conference of Eastern and Western men was held in New York, the action of the Grand Trunk and the New York, Ontario & Western in participating in reduced rates westward being the chief topic of discussion. The last-named road, as well as the Canadian Pacific, denied having taken any freight or quoted any rates to the West.

On Monday, further reductions were made between Chicago and the Missouri River, lumber and live stock being the subject of special reductions and grain being taken from Kansas City at ten cents to Chicago and five to St. Louis. Rates as far West as Wichita, Kan., were also reduced. In the afternoon the Chicago, Milwaukee & St. Paul reduced the whole tariff between Chicago and the Missouri River to a basis of 84 cents first class New York to St. Paul. The Chicago, Burlington